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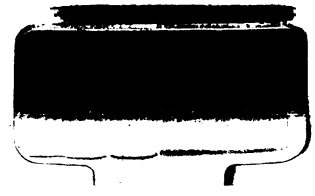
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COMPLIMENTS OF

J. A. BENSEL

State Engineer and Surveyor

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ANNUAL REPORT

OF THE

State Engineer and Surveyor

OF THE

STATE OF NEW YORK

For the Fiscal Year Ended September 30, 1911

Vol. 1



TRANSMITTED TO THE LEGISLATURE JANUARY 22, 1912

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JANUARY 22, 1912.

ANNUAL REPORT

OF THE

STATE ENGINEER AND SURVEYOR

OF THE

STATE OF NEW YORK

OFFICE OF THE STATE ENGINEER AND SURVEYOR,

ALBANY, N. Y., *January* 22, 1912.

To the Honorable the Speaker of the Assembly:

Sir.— I have the honor to transmit herewith my annual report for the year 1911.

Very truly yours,

J. A. BENSEL,

State Engineer and Surveyor.

249253

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The Report of the Gaging of Streams for 1911 is published in a supplemental volume.

REPORT.

To the Honorable, The Legislature of the State of New York:

I have the honor to present herewith the annual report of the State Engineer and Surveyor for the year 1911.

The principal duty imposed upon the State Engineer is that of carrying on the work of enlarging the State canals, but other duties are imposed by the Constitution and in accordance with such requirements during the past year I have attended meetings of the Canal Board, the Commissioners of the Land Office, the State Board of Canvassers, and the Board of Equalization of Assessment, and in accordance with chapter 646 of the Laws of 1911, the State Engineer was appointed a member of the State Highway Commission to perform duties along the line as nominated in the above law.

Under chapter 734 of the Laws of 1911, the State Engineer was made a member of the commission to investigate port conditions and pier extensions in New York harbor, and I therefore deem it proper that a reference to this subject should be made in this report. In conformity with the duties imposed, frequent meetings of this commission have been held, and it is gratifying to be able to report, that under permit which had been secured from the United States Government, a temporary extension to the pier headline in the transatlantic district of Manhattan Island has been secured, which enabled the city of New York to continue to be able to offer the proper accommodations for the largest steamships afloat.

The Commission of this State, acting in conjunction with one of like nature appointed by the Governor of the State of New Jersey, is now at work mapping new pier headlines for the harbor of New York, including that portion of the State of New Jersey lying within the port of New York. When this work will be accomplished, it will be the first work of the kind which has been done by the State since the lines were originally established by the last State Commission in 1855, and the changes which have come by commercial development are such as to render it imperative that the commercial interests of the State of New York, which practically

represent that of the country, should have a commission with the power of the State behind it to plot pier and bulkhead lines, and submit the same, it is to be hoped, along with those of the New Jersey Commissioners to the United States Government officials for approval.

The changes which have taken place within a short period of time in the size of the steamships entering the port of New York are extreme. This is manifested by the fact that since 1889 it has been necessary for the city to rearrange and change the transatlantic terminals on Manhattan Island, three separate times, so as to make it possible for the largest steamships to dock on the Manhattan Island waterfront. At this time it is still the desire of the transatlantic trade to continue to dock on Manhattan Island and there seems to be no possibility in the immediate future of a change, although at other locations in the port of New York there are piers of sufficient length to accommodate at the present time, and without alterations, the largest ships now built. Just exactly what the outcome of this situation is going to be, no one, I think, can tell at present, but the establishment of the commission referred to by the State should convince the people that the State has taken a step along the line of trying to adapt the port conditions to the requirements of commerce, and thus preserve for the State of New York its position of paramount importance in the commerce of the country, and do all that is possible to retain the prominence of the port of New York in its relation to the city, the State and the country at large.

During the past year surveys at various localities have been made for the Attorney-General and the Department has also cooperated with the United States Geological Survey in the topographic survey of the State, has proceeded with the work of gaging streams in the State and has also surveyed and monumented that portion of the lines previously unmonumented defining the boundaries between the State of New York and adjacent states and the province of Canada.

CANAL MAINTENANCE.

The maintenance of the canal system has been provided by various special acts of the Legislature, but the design and construction of the new work necessary has been made by the State Engi-

neer acting in conjunction with the Superintendent of Public Works, in whom is vested all questions in regard to the operation of the existing canal system.

During the past year but one break has occurred in the canal which in any way interfered with its operation, and although this was of quite extensive proportions, the break was repaired with a minimum hindrance to navigation. Several stretches of the Barge canal are now practically completed and are a part of the existing system and the maintenance of these sections under the direction of the Superintendent of Public Works should be provided for during the time that the remaining work is under construction.

BARGE CANAL.

Present State of Work on Barge Canal.

At the beginning of the year 1911, six years after the commencement of the construction of the Barge canal, there had been awarded in all 81 contracts for the work of construction, 8 of these contracts had been completed and 5 other contracts had been terminated for reasons. I also found 10 contracts which had been so recently let as not to be operative when work for the year commenced. Of the 81 contracts referred to above at the beginning of the year 1911 nearly one-half of these were noticeably backward in progress. During the past year, however, considerable work has been done on these backward contracts and it may be said that at the present time about 86 per cent of the amount of work which should be done under these backward contracts has been completed.

Record for the Year 1911.

During the year construction work to the value of $15,362,284 has been done. This is 60 per cent more than the highest yearly record heretofore and is three-fifths of the amount of work that had been done in the six preceding years. The accompanying diagram shows graphically the accomplishment of work under contract during the year.

Progress of the Removing of Obstructions at Railroad Crossings.

At several locations along the line of the new Barge canal the work of construction had been hampered and in some cases stopped

DIAGRAM SHOWING PROGRESS OF BARGE CANAL CONSTRUCTION DURING 1911.

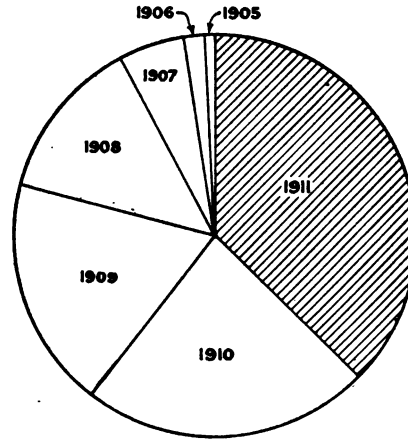
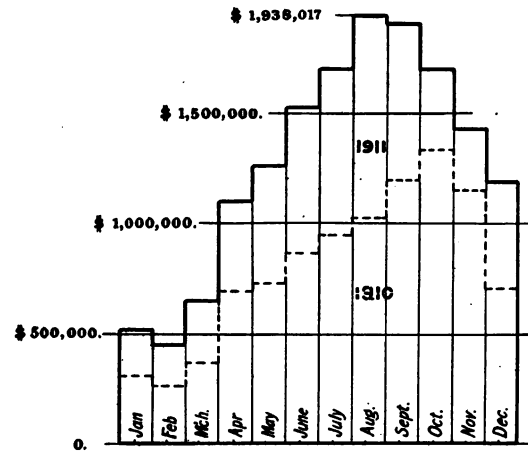


Diagram showing by years proportionate amount of construction work done to Jan. 1, 1912.



Value of construction work done during 1911, by months, in comparison with highest previous year.

by the fact that no negotiations had been consummated for the necessary rearrangement of the contracts along the railroads' right of way. Throughout the length of the Barge canal there are 86 separate crossings and in the majority of cases changes are necessary in the grade of the railroad and the requirements also necessitate new bridges being erected. Negotiations have been consummated for some of the most important of these crossings and the work where such negotiations have been completed is now under way by the railroad companies. Previous to the present year but little had been done in this regard and the nature of the work is both difficult and troublesome on account of the features which enter into the question of damage and the difficulty of maintaining the traffic while the work is in progress. During the past year six agreements have been consummated with the railroad companies and at eight other locations construction work has been started by the railroad companies and negotiations are at present pending at numerous other places and the progress of the canal work is but little hindered except at two localities which are now under way for settlement.

Troy Dam.

During the year 1910 action was taken by the previous Canal Board in an effort to cancel existing leases of the water not necessary for navigation purposes at the Troy dam. Early in the year discussion arose as to the right of the Canal Board to cancel in the manner which they did these existing leases on which depended the carrying on of certain portions of the work necessary for navigation at this locality by the United States Government. In accordance with the opinion of the Attorney-General the previous action by the Canal Board was not deemed proper and was rescinded. This brought about some discussion between the State authorities and the United States Government as to the building of the Troy dam, and while the questions at issue have not as yet been definitely decided it is hoped that in the near future the work of constructing the Troy dam may be undertaken by the State in such manner as was originally contemplated when the people voted the $101,000,000 for the improvement of the canal system, to extend from Congress street,

Troy, to Buffalo, and thus preserve for the benefit of the people the water which will be collected by the dam and which will not be needed for purposes of navigation. I am of the opinion that the State should construct this portion of the canal system in accordance with the vote of the people and thus secure the control and operation for the benefit of the people of not only the lock, which will be the throat or entrance to all of the State canal system, but also the water which will be available for power. What the possibilities may be in the way of the use of water for power which is not needed for navigation no one at the present time, I think, can safely prophesy, but it is certainly desirable that the State shall not relinquish its rights in these waters because it does not see any large returns in the immediate future. In the early history of the State the rights of the waters not needed for navigation were given away for nominal sums and subsequently it may be seen that these waters have been developed by private interests and have proved to be of large and extensive value to those who were the recipients of the State's favor in the early years of the nineteenth century.

In this connection attention is called to the conflicting provisions of certain statutes having reference to the sale or disposition of surplus waters or power created as a result of the Barge canal improvement, particularly chapter 494 of the Laws of 1907, amending the Barge Canal Law, and section 400 of the State Conservation Law enacted by the Legislature of 1911. Careful consideration should be given to this question. Keeping in mind the fact that payments in connection with structures for the Barge canal system are made from funds appropriated for the purpose of the canal improvement, it would seem advisable to consider the enactment of legislation to the end that revenues derived as the result of such construction should be applied to the retirement of the bonds issued or for the payment of interest upon the same.

Work Under Contract.

At the present time the value of the contracts which have been let for the construction of the Barge canal amount to $74,950,318, and to the close of 1911 the work done amounts to $41,232,007.



BARGE CANAL, CONTRACT NO. 2–E.

View of lock No. 2, at Waterford, with water in the lower level. A flight of three locks of present canal dimensions is seen at the right.

Main

The detail tables showing payments made under particular contracts are appended herewith.

To a great extent it may be said that the contracts as previously let were let with some haste and a lack of knowledge of the conditions existing. For this reason numerous alterations have been necessarily made in the contracts. In one case — that of the lock and dam at Scotia — the work has been abandoned by the contractor on account of the difficulties met with which were unexpected and unestimated at this locality. It has been necessary to redesign the dam and lock to meet the actual conditions. It was also found that somewhat the same conditions occurred with all of the bridges carrying the operating mechanism of all of the movable dams on the Mohawk river. As designed these bridges are too light for the purpose for which they were intended and it is a question whether it will be best to redesign these structures so that they may not only operate in the manner for which they were primarily needed, that of providing the mechanism for the raising and lowering of the movable dams, or to redesign them so that they may also serve as highway bridges, an addition that in many cases could be adopted at a small additional expense and would provide a desirable means of communication between the north and south banks of the river.

Two of the most important and necessary links of the Barge canal system were omitted from the previous contracts and these have received attention during the past year. One of these involves the location of the canal through the village of Medina and the other the lock and canal construction in the vicinity of Seneca Falls on the Cayuga and Seneca branch. The necessary preliminary steps for the preparation of the contracts at these localities have been made and contracts may be let in the immediate future.

In accordance with the authority vested under chapter 736 of the Laws of 1911, I appointed as consulting engineers on Barge canal work the following men:

George S. Greene, Jr., Mortimer G. Barnes, William H. Burr, T. Kennard Thompson and Joseph Ripley.

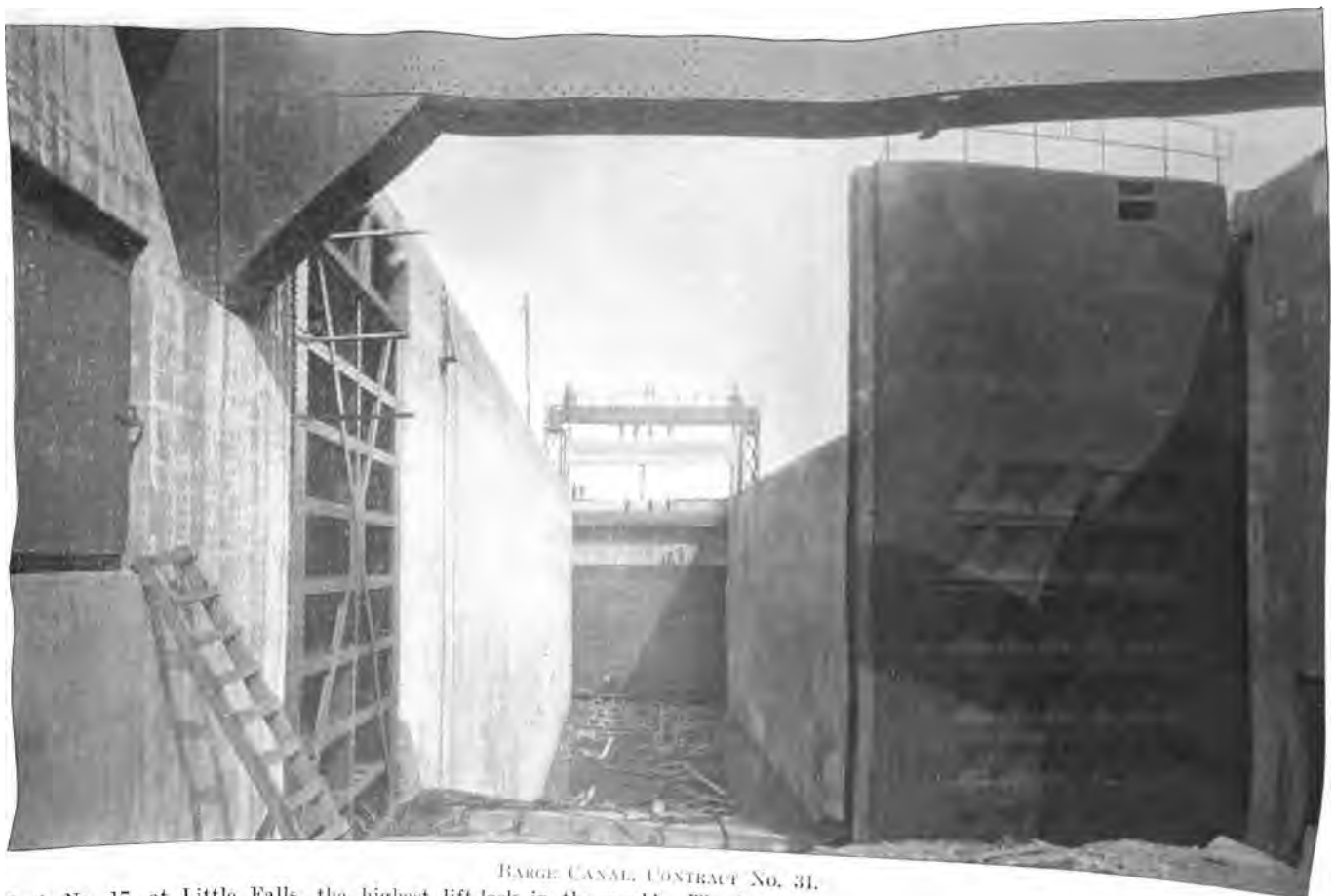
In all important subjects relating to changes in design or in the necessity for changes in contracts, these engineers have made

reports which are necessary, and the system under which they operate as consulting engineers, taking the place as they do of the former Advisory Board, is such that the Barge canal work has been expedited and the system has operated to the advantage of the State, due mainly to the fact that the consulting engineers perform their duties under the direction of the State Engineer and are available for consultation at all times.

The largest feature of construction which has been altered from the previous plans is that where a concrete trough has been substituted for the open excavation at Bushnell's Basin in the vicinity of Rochester, where the break referred to above occurred in the early part of the year. At this locality the old canal banks which has been assumed to be strong enough to support the canal with its new depth, were found insufficient and the contract originally let at this locality has been altered and amended to provide for concrete walls and bottom for the canal through this dangerous section of the work. As far back as 1852, the State as a result of a break in this locality was compelled to pay a considerable sum in settlement for damages suffered to abutting property owners, and as the canal occupies a high position above the surrounding country damage might result if any large break should occur in the future.

BOARD OF CLAIMS SURVEYS.

It has been the practice for many years past for the State Engineer's Department to make surveys and present evidence of an engineering character before the courts in litigation for damages alleged to have been suffered on account of the acts of the State, particularly in connection with the canal system. The evidence necessary in the majority of these cases is of a highly technical character, such as to require engineers competent to qualify in the particular branches of the profession. Such evidence is supplied by this Department for the use of the Attorney-General in defending cases before the Board of Claims, the expense incurred being defrayed from a special appropriation for this purpose. For continuing this work I therefore recommend that an appropriation of $5,000 be made, which is the same as that appropriated for the past year.



BARGE CANAL, CONTRACT No. 31.

Lock No. 17, at Little Falls, the highest lift-lock in the world. The lower gate, of lift type, is seen in the closed po... the rows of men, at six different elevations, aid in appreciating its size. The high side walls and ... the lock appear narrower than the standard width, which is 45 ...

MAPPING CANAL LANDS.

The canal lands of the State are bounded by the so-called "Blue Line," shown on the old maps embracing the canal lands of the State and on file in the offices of the State Engineer and Surveyor and the State Comptroller. In 1834 maps of the surveys of the State canal lands had been made and certified to by the Canal Commissioners and filed in the office of the State Comptroller. These maps of 1834 are the only canal maps which have ever been made authoritative by certificate. Until the beginning of the Barge canal construction none of these boundary lines had ever been monumented. Since the establishment of such lines, land marks have been obliterated and changes have taken place so that with the advance of time it has become more and more difficult to retrace these lines.

During the past year under an appropriation made by the Legislature two survey parties have been employed relocating the Blue Line and preparing new maps showing the same. The initial appropriation for carrying on this work is now nearly exhausted. The Blue Line should be relocated before the further obliteration of the various land marks by which the same may be identified, and it is therefore imperative that the continuity of this work be not interrupted, and I accordingly recommend that an appropriation of $10,000 be made for continuing this work.

STATE BOUNDARY LINES.

Chapter 678 of the Laws of 1892 authorized the State Engineer and Surveyor to examine the monuments marking the boundary lines at least once every three years and to replace any of the injured or misplaced monuments. The total length of the State's boundary lines is 1,416 miles, distributed about as follows: Canadian line, 431 miles; Vermont line, 171 miles; Massachusetts, 50 1-2 miles; Connecticut line to Long Island Sound, 81 miles; along the ocean around Long Island to the New Jersey shore, 262 miles; New Jersey line, 92 1-2 miles; Pennsylvania line, 344 miles, to the beginning of the Canadian line in the middle of Lake Erie. These boundaries are fixed by accepted agreements and are marked by natural water courses and also by monuments. In making examinations during recent years no serious difficulties have

been found except along the Connecticut boundary. This line was in dispute for nearly two hundred years and about fifty years ago it was established and monumented by the New York Commissioners, although it was twenty years later before the Connecticut authorities accepted this line. These monuments, however, were not of a permanent character and their condition has been for some time unsatisfactory. During the last months of 1908 and in the seasons of 1909 and 1910, work of remonumenting this line had been in progress and was finished during the latter part of the year 1910. Detail statement of the work done is appended to the annual report of the State Engineer and Surveyor for the year 1910, which was practically final in character, and at the present time the above is called attention to in order to state that the whole work has been completed in a satisfactory manner.

The reports of representatives of the State Engineer's Department showing the condition of the boundary lines between New York and Vermont, Canada and New Jersey are appended to this report.

Certain of the monuments on the Pennsylvania and New Jersey boundaries are in need of resetting and replacing and an effort is now being made with the authorities of the adjoining states to secure their coöperation in replacing these monuments. To carry this work on for the coming year I recommend that an appropriation of $1,000 be made for this purpose.

TOPOGRAPHIC SURVEY OF THE STATE.

For nearly twenty years New York State in conjunction with the United States Government has been making topographic surveys and maps of the territory of the State. For about three-quarters of the above period it was customary for New York to make an appropriation of $30,000 each year and a like amount was appropriated for this work by the Federal government. In 1905, however, the State of New York failed to make an appropriation, but the following year the Legislature again supplied funds, but reduced the amount. Since the latter mentioned year about $10,000 has been the usual yearly allowance and at the present time about 85 per cent of the total area of the State has been mapped, but the funds have so reduced the speed that at the present rate of progress



BARGE CANAL, CONTRACT NO. 55.

A general view of the dam at Delta reservoir — taken when the dam was completed, except two gaps, one for passing the waters of the Mohawk river and the other for the old Black River canal.

Mau

nine years will be required to complete the survey. These maps are of value to every one in the State and are used particularly in connection with public or private enterprises that have to do with location and are therefore a necessary knowledge of topography. For continuing this important work I recommend that an appropriation the same as that of last year, namely, $10,000, be made by the Legislature and invite your attention to the consideration of the advisability of increasing the appropriation on the part of the State in order that this work may be brought to a completion at an earlier date than can possibly be done with the appropriations which have been made in recent years.

HYDROGRAPHIC SURVEY.

In preparing the plans for Barge canal work, particularly in determining upon the sources of water supply and the storage facilities, the records obtained as a result of the coöperative hydrographic survey by the State of New York and the Federal government, have been of material value. The amount appropriated by the State for this coöperative hydrographic survey during recent years has been $1,500 annually. The information obtained from such coöperative work was not sufficient to supply the needs of this department in considering the design for the Barge canal and it was therefore necessary to establish a bureau of hydraulics, which bureau had supervision over the gaging of streams tributary to the Barge canal. The records obtained as a result of the coöperative hydrographic survey and the establishment of the bureau of hydraulics in this department are of value not only to this department but to various other State departments, the State Conservation Commission and also to municipalities and to companies or individuals interested in water supply or in the development of power along the streams of the State. I therefore recommend that the usual appropriation of $1,500 be made by the Legislature in order to continue the coöperative hydrographic survey of the State.

SURVEYS FOR STATE DEPARTMENTS AND COMMISSIONS.

During the year surveys and investigations have been made at different localities for various State departments or commissions,

some of these covering considerable area and requiring the employment of employees of this department for various periods of time. The custom for years has been that the State Engineer has made such surveys, being reimbursed by the department or commission for whom the same were made upon the completion of the work embraced therein. There is no objection to the State Engineer making such surveys and investigations, and in fact the State Engineer should, I believe, make all surveys for the various State departments or commissions not having directly under their control an engineering bureau. The principal difficulty encountered in this arrangement has been in the financing of the various survey parties. It has been necessary for the State Engineer to advance money in order to defray the expenses incurred and for the salaries of the employees of the department, inasmuch as the department or commission for which the survey is made often has not available funds which may be drawn upon to defray such expenses at the time of the making of the survey. In order to remedy this condition, there should be granted to the State Comptroller a loan fund of at least $5,000 upon which the State Engineer might draw drafts to be used temporarily for the payment of such engineering expenses, the amount of such drafts to be refunded by the department or commission upon the completion of the work and when funds under the direction of such department or commission are made available.

BLACK RIVER SURVEY.

Chapter 190 of the Laws of 1911, directed the State Engineer to make a survey and prepare plans and estimates for improving the Black river for navigation between the State dam at Carthage and Sacketts Harbor on Lake Ontario. At the present time that portion of the Black river lying between Carthage and Lyons Falls is a part of the canal system of the State, known as the Black River improvement. This section was improved for navigation between the years 1854 and 1861. On account of the dilapidated condition of the lock into the river at Lyons Falls there has been no communication between the Black River canal and the river for navigation for several years.



BARGE CANAL, CONTRACT NO. 63.

View of the side walls of the concrete trough upon the Irondequoit embankment.

Main

In accordance with the provisions of the above mentioned statute, I have had in the field a survey party during the past year engaged in investigating, and making surveys of several possible routes for improving the Black river for navigation between Carthage and Sacketts Harbor, termini specified in the law. Between Carthage and Watertown it appears to be practicable to canalize the Black river following very closely the thread of the stream with a few deviations from the same. Below Watertown the character of the river is such as to make it necessary to select a new location, and accordingly surveys of the various possible routes have been made. A careful investigation has been and is now being carried on in order to determine upon adequate and available sources of water supply. There is appended a report of the Division Engineer showing in detail the work which has been accomplished to the end of the current year. This work is rapidly nearing completion and when the same shall have been completed a final report will be made to the Legislature.

FIRE-PROOF DEPOSITORIES FOR STATE RECORDS.

During the past year the State learned a lesson of the folly of neglecting to provide satisfactory fire-proof vaults in which to place its valuable and irrecoverable records. In the custody of the State Engineer there are innumerable records of inestimable value, not only to the State authorities but to the individuals who have occasion to consult the same; the majority of these records cannot be replaced if once destroyed. The catalog recently published, giving a list of maps and papers filed in the Land Bureau of the State Engineer's Department, gives an idea of the value of the records of but one bureau of this department.

In 1910 the Legislature made provision by a small appropriation for the necessary repairs and the installation of fire-proof vaults in the office building used by the State Engineer's Department and the department of Public Works at Syracuse. Such action will provide for the protection of the records in the Division office at Syracuse, but there are still in the office of the Division Engineer of the Western Division at Rochester, and in the Eastern Division office at Albany and the State Engineer's office at Albany many records which should be placed in suitable fire-proof vaults.

It would be folly to wait for the relocating of the State Engineer's office in some other building, according to a tentative plan recently advocated, before providing suitable fire-proof vaults for the records of this department. The destruction of the State library while the new Educational building was in process of construction particularly emphasizes this point. I therefore recommend that provision be made at the earliest possible date for providing suitable fire-proof depositories for the records in the Division Engineers' offices at Albany and Rochester and for the records and valuable papers in the office of the State Engineer at Albany.

BRIDGE OVER THE MOHAWK RIVER.

In canalizing the Mohawk river between Cohoes and Schenectady, two highway bridges existing at present and adjacent to aqueducts carrying the present canal across the river, will require extensive modifications in order to meet the Barge canal requirements. Present indications are that the owners of these bridges will not expend funds necessary in order to so modify these structures as to meet Barge canal requirements, but will allow them to be removed. There will then be no means for highway traffic to cross the Barge canal within this distance of 19 miles between Schenectady and Cohoes. It therefore seems to me proper for the State to construct a bridge at some point between Cohoes and Schenectady as will best meet the demands of highway traffic in this vicinity. I therefore recommend that an appropriation be made for the construction of such a bridge over the Barge canal at some point between Cohoes and Schenectady.

DAM AT COHOES.

Below the point where the present Champlain canal crosses the Mohawk river in the vicinity of Cohoes there exists a State dam which constitutes a part of the present canal system. On account of the location of this dam and the natural topography, there are certain rapids immediately below the dam, and the ice passing over the crest of the dam in the spring floods falls directly upon the toe and apron of this dam. On account of such condition



BARGE CANAL, CONTRACT No. 63.

View of the completed concrete trough upon the Irondequoit embankment.

Mail

this structure has been damaged each year and repairs made from time to time. The last repairs to this dam were made in 1904 and the structure is now in a dilapidated condition. It seems inadvisable to again attempt to make repairs to the old structure and, accordingly, I recommend that provision be made for the construction of a new dam at this point.

POLLUTION OF THE WATERS OF THE BARGE CANAL SYSTEM.

Realizing the importance of preventing the pollution of the waters of the State canal system and the necessity for protecting the health of the citizens of the State, I have recently taken up with the Governor of the State and with the State Department of Health the question of providing adequate sewage disposal plants for the municipalities along the canal system. The State Department of Health has advised that the present public health statutes are inadequate to correct the existing conditions; that prior to 1903 the State Department of Health had no power to enjoin or remove sewage pollution from any State waters. In 1903 an act was passed which, while providing a remedy against future pollution, specifically exempted municipalities and industrial plants discharging sewage and waste into the waters of the State at the time of such enactment. In 1910 a further enactment was made to the Public Health Law investing the Department of Health with further powers, which, however, fail in effective purpose on account of the limitations to cases of pollution in which, after full investigation and report, there is established a public nuisance or menace to health.

In view of the inadequate statutes at the present time and on account of the approaching completion of the Barge canal, legislation should be enacted without delay in order to remedy the existing conditions. In order to allow for the installation of sewage disposal plants before the opening of navigation statutes must be enacted at once, the precise form of such legislation to be along such lines as may be determined by future conference between the Superintendent of Public Works, the State Engineer and Surveyor and the Department of Health.

MAP OF CANALS.

Accompanying my report there is a map showing the canals of the State. Unlike canal maps of former years, its extent includes the whole State, since now the terminals to be built throughout the State become a part of the canal system. Its scope also has been extended, so that it includes canals once in existence but now abandoned, as well as present canals and the improvements now in progress. In addition the system of State reservoirs is shown. To avoid confusion, little besides the canals and reservoirs is given, except the natural water courses, and these are shown with some completeness.

CANAL TERMINALS.

At the recent November election the people of the State approved of the referendum providing for the issuing of bonds in order to provide funds for the construction of suitable terminals for the Barge canal system. Immediately upon learning of the result of the vote of the people which was not until the official canvass on December 13, I appointed a terminal engineer to take charge of this work as a whole, and have appointed engineers to take up the work of investigating the terminal questions at New York and Buffalo. It is my purpose to establish offices in the principal cities where terminals are to be built in order to progress this work as rapidly as possible. The preparation of plans and the construction of terminals for the canal system, which is a matter of great importance, seems to have been delayed by the State authorities in the past. It is planned to hold conferences in the different localities in order to ascertain accurate information relative to the nature of the traffic that may be expected on the canal system and thereby provide adequate terminal facilities. In New York city, fortunately, similar work has been carried on to such an extent that many standards have been fixed. The many miles of sea wall and the well known group of docks, the Chelsea improvement, recently built under the direction of the Commissioner of Docks and Ferries, will furnish not only examples but standardized plans which will save considerable time in designing. At all terminals particular attention will be given to freight handling devices, to the end that the Barge canal termi-

nals may excel in this particular and fix the conditions that they may meet.

COMPARISON BETWEEN BARGE CANAL AND PANAMA CANAL.

Attention is frequently called to the progress being made in the construction of the Panama canal under the direction of the Federal government. The Barge canal being constructed by the State of New York is not so widely known throughout the country, and a few comparisons relative to the work of those two undertakings is both interesting and instructive.

The Panama canal is 50 miles in length; the Barge canal, including navigable lakes, 530 miles in length. The estimated cost of the Panama canal is $375,000,000. The estimated cost of the Barge canal is $108,000,000. But these estimates of cost are not indicative of the amount of work being done. On account of the large amount of excavation necessary at the Culebra cut in the Panama canal, the total excavation is much greater than for the Barge canal, being 175,000,000 cubic yards as compared with 110,000,000 cubic yards, but it is of interest to note that the preliminary estimate for the Barge canal excavation exceeded the estimate for excavation for the Panama canal by approximately 7,000,000 cubic yards. Concrete to the amount of 5,000,000 cubic yards will be used in the Panama canal construction, and approximately 3,000,000 cubic yards on Barge canal construction.

At Panama the concrete is placed chiefly in the six pairs of locks, while in the Barge canal construction, the number of structures greatly exceeds the small number at Panama. There will be 57 standard locks on the Barge canal and several smaller ones. Thirty dams will be built and several remodeled. The bridges to be constructed will number nearly 200, making the total number of structures to be erected in the Barge canal improvement between 350 and 400.

Comparisons are not altogether possible where conditions are variable, but taking into consideration the length of the canal, the number of structures, the alignment through a well developed country and the necessity for maintaining navigation, together with the difficulties encountered through cities in the construction of the Barge canal, the people of the State have some reason for satisfaction in their unaided accomplishment in canal construction.

STATE FAIR EXHIBIT.

For the State Fair of 1911 the Legislature made a small appropriation in order to enable various State departments to prepare exhibits and in response to the request of the State Fair Commission the State Engineer's Department prepared an exhibit showing the various phases of the Barge canal improvement. Models were exhibited showing the great variety of typical sections of the canal prisms and the different structures being erected and a model of one of the locks workable as a whole was in operation to show the method of lockage of canal boats. By the use of motion pictures and a map prepared giving a bird's-eye view of the canal system throughout the State the people were given an idea of the nature of the work now in progress.

CHARTING OF NEW YORK'S NAVIGABLE WATERS.

During the year I have coöperated with the United States Department of War for the charting of the navigable waters of New York State. The last Sundry Civil Act extended the lakes survey to include these waters and from the carrying out of this provision, in which I have coöperated, there will result charts for the State canal system which are similar to the standard charts of the United States and Canada.

APPENDED REPORTS.

Engineering Expenses: Contract Work.

Appended to my report there will be found, first tables giving summaries of the engineering expenses of the department for the fiscal year, followed by other tables showing the construction contracts completed during the year and also those in force at its close. The details of the expense tables are contained in the reports of the three Division Engineers.

Division Engineers.

The canal is divided into three divisions and the work in each division is in charge of a Division Engineer. The three Division Engineers have made reports of the year's work in their respective divisions. In these are contained the reports of the Resident Engineers, which describe in detail what has been accomplished in the way of construction on the Barge canal.

Testing Laboratory for State Works.

For many years the State Engineer's Department has included a testing laboratory where are made tests of all hydraulic cement used for State work, not only for the numerous works which are under the direction of the State Engineer, but also for those supervised by the State Architect, in the many buildings which he constructs. The character and importance of the work being done on the Barge canal has also necessitated the testing of sand submitted for use in the large concrete structures. The testing of cement for State highway improvement is still carried on in this laboratory, though at the expense of the Highway Department.

The methods of cement testing are in accord with the latest and best practice. The high grade of requirements has been maintained during the year, thus keeping up with the improved methods and products of American manufacturers of Portland cement.

Cement proposed for use in large quantities on the Barge canal is now generally inspected at the mill and this has become an important branch of the work of the laboratory.

The detailed account of the year's work will be found in the appended report of the Resident Engineer in charge of the laboratory.

Land Bureau.

The Land Bureau of the State Engineer's Department has charge of the sale of State land and of the custody and care of ancient records. The ancient records on file in this department, as well as the modern ones, are of great value for reference, and it has been the policy in recent years to add to them whenever this can be done without cost to the State.

Because the State Engineer is one of the Commissioners of the Land Office and maintains the Land Bureau in connection with this membership, the commissioners generally refer matters calling for the making of examinations of maps. For this purpose a small fund is needed and therefore I recommend the appropriation of $1,000.

Many of the ancient maps and records are so old and are referred to so often that they are fast being destroyed. They are too valuable to be thus lost, and, accordingly, I recommend the

appropriation of $1,000 for publishing copies of some of them, which will both save the originals and permit a wider use of the information they contain.

The detailed report of the engineer in charge of the Land Bureau will be found appended to this report.

Bureau of Hydraulics.

Since the beginning of coöperative stream gagings by the State and the United States, it has been customary to publish the results of these gagings as a part of the State Engineer's annual report. These records are valuable and, as time goes on and their field becomes longer, they will grow more valuable. Several times this report has been published in a supplemental volume, and this plan will be followed in the present instance, since it is much more convenient and accords with general practice to publish the data by calendar years, and the amount of work in compiling, computing and publishing the tables after the close of the year is such as to delay the printing of the remainder of the report.

In 1906 a bureau of hydraulics was established in the Barge canal office. Besides studying the general problems in relation to the hydraulics and hydrology of the rivers and canals, arising in connection with the design and construction of the canal, and the preparation of the technical defense for the State in claims arising from the appropriation of water power, from backwater caused by Barge canal dams, and in other hydraulic claims, this bureau maintains gaging stations to determine water levels and measure the flow of streams.

Data acquired in this latter work constitute the published report. These gagings are supplemented by those derived from the coöperative survey, and through the courtesy of the State Conservation Commission, the Board of Water Supply of the City of New York and various corporations and individuals, others are added, so that the whole report becomes complete.

Respectfully submitted,

J. A. BENSEL,
State Engineer and Surveyor.

Engineering Expenses for the Fiscal Year Ended September 30, 1911

Table of Contracts Completed During the Fiscal Year Ended September 30, 1911

Table of Contracts Pending September 30, 1911

Roster of Employees in Office of State Engineer and Surveyor

Engineering Expenses for Fiscal Year Ended September 30, 1911.

Ordinary Repairs to Canals.

WORK.	Act. Chap.	Act. Year.	Division.	Amount.	Total.
Erie canal	512	1910	Eastern	$8,001 28	
Champlain canal	512	1910	Eastern	3,998 72	$12,000 00
Erie canal	512	1910	Middle	$8,562 24	
Cayuga and Seneca canal	512	1910	Middle	134 26	
Oswego canal	512	1910	Middle	53 50	8,750 00
Erie canal	512	1910	Western	$8,982 66	8,982 66
Total					$29,732 66

Construction of Barge Canal.

WORK.	Act. Chap.	Act. Year.	Division.	Amount.	Total.
Head office account	147	1903	Eastern	$265,815 87	
	67	1911			
Erie	147	1903	Eastern	191,916 53	
	67	1911			
Champlain	147	1903	Eastern	122,084 55	
	67	1911			$579,816 95
Erie	147	1903	Middle	$146,326 89	
	67	1911			
Oswego	147	1903	Middle	72,557 03	
	67	1911			
Cayuga and Seneca	391	1909	Middle	46,282 86	265,166 78
Erie	147	1903	Western	$233,946 46	
	67	1911			233,946 46
Total					$1,078,930 19

Bureau of Bridges.

WORK.	Act. Chap.	Act. Year.	Division.	Amount.	Total.
Bureau of bridges	513	1910	Eastern	$871 29	
	811	1911			
Total					$871 29

Special Work.

WORK.	Act. Chap.	Act. Year.	Division.	Amount.	Total.
Seneca street bridge, Utica	454	1909	Middle	$3 01	
Franklin street bridge, Syracuse	453	1909	Middle	2,100 50	
Washington street bridge, Rome	522	1910	Middle	1,928 12	
					$4,031 63
Georgia street bridge, Buffalo	452	1909	Western	$180 94	180 94
Total					$4,212 57

Special Surveys.

WORK.	Act. Chap.	Act. Year.	Division.	Amount.	Total.
Examination of monuments and maps	513	1910	Eastern	$3,124 76	
State Board of Claims surveys	433	1909	Eastern	305 49	
Mapping canal lands	199	1910	Eastern	6,956 38	
Improvement of Mohawk river and West Canada creek	132	1911	Eastern	1,690 46	
Minisceongo bridge pier	513	1910	Eastern	362 52	
Topographic survey	513 811	1910 1911	Eastern	7,741 10	
Hydrographic survey	513 811	1910 1911	Eastern	979 76	
					$21,160 47
State Board of Claims surveys	513	1910	Middle	$2,308 87	
Black river survey	190	1911	Middle	2,189 57	
Mapping canal lands	199	1911	Middle	5,648 81	
					10,147 25
Total					$31,307 72

Summary of Engineering Expenses for the Fiscal Year Ended September 30, 1911.

DIVISION.	Ordinary repairs to canals.	Construction of Barge canal.	Bureau of bridges.	Special work.	Special surveys.	Total.
Eastern	$12,000 00	$579,816 95	$871 29		$21,160 47	$613,848 71
Middle	8,750 00	265,166 78		$4,031 63	10,147 25	288,095 66
Western	8,982 66	233,946 46		180 94		243,110 06
Totals	$29,732 66	$1,078,930 19	$871 29	$4,212 57	$31,307 72	$1,145,054 43

TABLE OF CONTRACTS COMPLETED DURING THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Special Work.

CONTRACTOR.	Date of contract.	Character of work.	Division.	Act.		Appropriation.	Engineer's preliminary estimate.	Contract price.	Final payment.
				Chap.	Year.				
N. D. Peters Co	Nov. 19, 1909	Seneca street bridge, Utica	Middle	454	1909	$24,000 00	$15,473 50	$15,992 75	$18,596 47
H. Tosh & Son	Dec. 27, 1910	Washington street bridge, Rome	Middle	522	1910	20,000 00	15,486 00	14,777 50	14,738 32
Lupfer & Remick	Jan. 29, 1910	Georgia street bridge, Buffalo	Western	452	1909		18,371 00	18,121 00	17,164 70

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Division.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Final payment.
Empire Engineering Corporation	April 18, 1905	Contract No. 4, Erie canal — The 4¼ miles east of Oneida lake	Middle	$812,560 00	$726,779 75	$720,072 76
Kelley Bros. Contracting Co	Dec. 28, 1906	Contract No. 18, Erie canal — Mindenville to Castle creek	Eastern	785,980 00	611,382 39	476,978 85
Penn Bridge Co	April 19, 1909	Contract No. 32, Champlain canal — Lock-gates, etc., on contracts Nos. 3, 25 and 27	Eastern	59,820 00	46,797 00	44,375 31
Butler Bros. Construction Co	Dec. 5, 1908	Contract No. 41, Erie canal — Irondequoit creek crossing	Western	383,190 00	273,237 50	241,644 00
Scott Brothers	May 6, 1908	Contract No. 45, Erie canal — Through Baldwinsville; Caughdenoy dam	Middle	425,124 00	472,802 35	418,651 93
Scott Brothers	Aug. 16, 1909	Contract No. 53, Oswego canal — Through Phoenix	Middle	200,500 00	167,585 00	164,575 52

TABLE OF CONTRACTS PENDING SEPTEMBER 30, 1911.

Special Work.

CONTRACTOR.	Date of contract.	Character of work.	Division.	Act.		Appropriation.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Payments to September 30, 1911.
				Chap.	Year.				
E. S. Sickles	April 28, 1911	Reconstruction of the center pier (protection pier) of the draw bridge over Minisceongo creek, Rockland Co	Eastern	513	1910	$5,000 00	$4,461 00	$4,485 00	
Cunningham-Woodard Co.	June 15, 1910	Raising highway at contract No. 78, near Fulton	Middle	13	1909			15,936 90	$9,981 00
Cunningham-Woodard Co.	Nov. 28, 1910	Highways adjacent to Delta reservoir	Middle	453	1909			43,938 00	23,121 00
Chas. B. Foster	Dec. 3, 1910	Franklin street bridge, Syracuse	Middle	527	1910		43,131 75	38,245 75	12,726 00

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws; Chapter 391, Laws of 1909.

CONTRACTOR.	Date of contract.	Character of work.	Division.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work done to September 30, 1911.
Empire Engineering Corporation	April 18, 1905	Contract No. 1, Champlain canal — Hudson river, Northumberland to Fort Miller and Crocker's Reef to Fort Edward	Eastern	$619,846 00	$580,423 57	$474,400 00
Ferguson Contracting Co	April 3, 1905	Contract No. 2, Erie canal — Through Waterford to contract No. 11	Eastern	1,022,640 00	955,118 01	694,390 00
*Holler & Shepard	Dec. 8, 1909	Contract No. 2-E, Erie canal — Through Waterford to contract No. 11	Eastern	263,189 40	271,656 48	228,670 00
Sundstrom & Stratton	April 4, 1905	Contract No. 3, Champlain canal — Fort Miller to Crocker's Reef	Eastern	760,576 00	657,273 09	633,290 00

E. J. Doyle & Co.	Dec. 8, 1910	Contract No. 4-B, Erie canal — Concrete highway bridge along Burdick's road	Middle	1,353 10	1,385 12	1,310 00
Empire Engineering Corporation	April 18, 1905	Contract No. 5, Erie canal — Mosquito Point to Fox Ridge	Middle	421,252 00	375,871 57	125,820 00
Frank A. Maselli	May 3, 1905	Contract No. 6, Erie canal — Buffalo road, southwest of Rochester, to near South Greece	Western	1,381,662 50	1,026,549 80	1,025,710 00
Pittsburg-Eastern Co	May 22, 1906	Contract No. 8, Erie canal — Dams and locks at Scotia, Rotterdam and Cranesville	Eastern	1,518,382 00	1,516,788 98	920,420 00
Thomas Crimmins Contracting Co.	Mar. 18, 1908	Contract No. 9, Erie canal — Eagle Harbor to Beal's bridge	Western	724,014 00	803,297 18	647,120 00
McDermott Contracting Co.	June 7, 1906	Contract No. 10, Oswego canal — Through Fulton	Middle	1,149,988 00	1,111,964 57	668,360 00
Fort Orange Construction Co.	May 21, 1906	Contract No. 11, Erie canal — From contract No. 2 to Mohawk river	Eastern	1,671,385 00	1,352,834 60	1,130,370 00
James Stewart & Co.	Sept. 23, 1907	Contract No. 12, Erie canal — Oneida lake to Mosquito Point	Middle	3,082,560 00	3,548,817 19	2,120,830 00
Penn Bridge Co.	Nov. 7, 1908	Contract No. 13, Erie canal — Bridges on contracts Nos. 18 and 12	Eastern Middle	29,775 00	28,125 50	20,180 00
Acme Engineering & Contracting Company	Sept. 10, 1907	Contract No. 14, Erie canal — Mohawk river, Crescent to Rexford Flats aqueduct; dams at Crescent and Mindenville; dams and locks at Vischer's Ferry, Canajoharie, Yosts and Fort Plain	Eastern	2,875,570 00	2,975,792 72	2,347,350 00
Atlantic, Gulf & Pacific Co.	Aug. 9, 1906	Contract No. 15, Champlain canal — Whitehall to Comstock	Eastern	1,380,760 00	1,481,791 75	1,317,060 00
United Construction Co.	Dec. 20, 1906	Contract No. 16, Erie and Champlain canals — Bridges on contracts Nos. 11, 25 and 27	Eastern	70,719 00	78,715 15	5,380 00
The Scofield Company	Dec. 29, 1906	Contract No. 17, Erie canal — Dams and locks at Amsterdam and Tribes Hill	Eastern	883,926 00	842,417 68	57,560 00
*Alexander Murdoch	Mar. 3, 1908			836,220 76	812,286 46	738,980 00
Great Lakes Construction Co.	Nov. 26, 1906	Contract No. 19, Erie canal — Sulphur Springs guard-lock to Ellicott creek	Western	1,038,245 00	891,401 16	703,130 00
Houston Barnard	Aug. 20, 1909	Contract No. 20-A, Erie canal — Little Falls to Castle creek	Eastern	499,000 00	490,592 50	119,430 00
S. Pearson & Son, Inc.	Aug. 2, 1909	Contract No. 20-B, Erie canal — Mohawk river, Mindenville to Canajoharie	Eastern	848,540 00	933,194 00	161,210 00
American Pipe & Construction Co.	Aug. 18, 1909	Contract No. 20-C, Erie canal — Mohawk river, Canajoharie to Yosts	Eastern	570,600 00	585,720 00	324,260 00
American Pipe & Construction Co.	Aug. 18, 1909	Contract No. 20-D, Erie canal — Mohawk river, Yosts to Rexford Flats	Eastern	2,260,000 00	2,685,477 40	62,740 00
Lane Brothers Co.	April 17, 1910	Contract No. 21, Erie canal — Genesee river to near N. Y. C. bridge	Western	1,475,900 00	1,323,150 00	474,580 00
M. Fitzgerald	Sept. 24, 1910	Contract No. 22, Erie canal — Bridges on part of contract No. 12	Middle	107,126 00	117,194 50	14,960 00
Millard & Lupton Co.	Aug. 18, 1909	Contract No. 23, Erie canal — Kings Bend to Genesee river	Western	2,166,600 00	1,808,797 00	660,380 00
Atlantic, Gulf & Pacific Co.	Nov. 19, 1906	Contract No. 25, Champlain canal — Comstock to Dunhams Basin	Eastern	1,849,831 00	1,694,037 00	1,410,290 00
Kinser Construction Co.	Nov. 23, 1906	Contract No. 27, Champlain canal — Dunhams Basin to Fort Edward	Eastern	998,920 00	723,268 61	378,650 00

* Contract relet.

TABLE OF CONTRACTS PENDING SEPTEMBER 30, 1911 — (*Continued*).

Construction of Barge Canal — (Continued).

Chapter 147, Laws of 1903, and amendatory laws; Chapter 391, Laws of 1909.

CONTRACTOR.	Date of contract.	Character of work.	Division.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work done to September 30, 1911.
*Holler & Shepard	Dec. 1, 1910	Contract No. 27-A, Champlain canal — Dunhams Basin to Fort Edward	Eastern	$409,455 00	$450,181 80	$73,250 00
Maryland Dredging & Contracting Company	April 3, 1909	Contract No. 29, Erie canal — Sterling creek to Herkimer-Oneida county line	Eastern	812,350 00	674,249 66	333,650 00
Acme Engineering & Contracting Company	July 16, 1909	Contract No. 30, Erie canal — Mohawk river, Little Falls to Sterling creek	Eastern	2,650,500 00	2,482,006 88	907,370 00
Casey & Murray	Sept. 2, 1908	Contract No. 31, Erie canal — Through Little Falls; Rocky Rift dam	Eastern	813,800 00	834,927 78	662,960 00
Penn Bridge Company	Jan. 7, 1910	Contract No. 33, Erie, Champlain and Oswego canals — Lock-gates, etc., on contracts Nos. 2, 10, 11 and 15	Eastern Middle	183,618 60	199,639 70	158,780 00
Gilmour-Horton-Allen Co	Sept. 16, 1907	Contract No. 35, Oswego canal — Through Oswego	Middle	752,760 00	722,501 67	433,810 00
J. D. Miller	May 3, 1910	Contract No. 36, Erie canal — Operating winches for movable dams in Mohawk river	Eastern	72,000 00	46,800 00	5,850 00
Henry P. Burgard	Dec. 9, 1910	Contract No. 37, Oswego canal — Between Fulton and Oswego	Middle	1,992,220 00	2,323,958 50	607,840 00
James Stewart & Co	April 15, 1910	Contract No. 39, Oswego canal — Between Three River Point and Fulton	Middle	972,900 00	1,048,674 40	130,600 00
United Engineering & Contracting Company	Nov. 27, 1908	Contract No. 40, Erie canal — Locks at Lockport to Sulphur Springs guard-lock	Western	2,516,743 00	2,190,870 30	1,263,120 00
Shanley-Morrissey, Inc	July 9, 1909	Contract No. 42, Erie canal — Herkimer-Oneida county line to Oriskany road	Middle	1,312,814 00	1,043,314 85	441,270 00
M. A. Talbot Company	Oct. 15, 1909	Contract No. 43, Erie canal — Oriskany road to Mud creek	Middle	1,529,885 00	1,362,869 50	86,960 00
Scott Brothers	Jan. 8, 1910	Contract No. 44, Erie canal — Mud creek to contract No. 4	Middle	1,926,093 00	1,721,518 00	587,070 00
Kinser Construction Co	Nov. 23, 1908	Contract No. 46, Erie canal — Fox Ridge to Galen town line	Middle	1,367,583 00	1,221,278 80	605,960 00
Crowell-Sherman-Stalter Co	Nov. 30, 1908	Contract No. 47, Erie canal — Town of Galen to Lyons	Western	1,434,148 00	1,279,327 60	720,590 00

Crowell-Sherman-Stalter Co	Dec. 29, 1910	Contract No. 48, Erie canal — Near N. Y. C. & H. R. R. R. crossing at Lyons to near West Shore R. R. crossing at East Newark	Western	1,626,811 50	1,697,911 50	75,970 00
Merritt Construction Co	Feb. 21, 1910	Contract No. 49, Erie canal — Palmyra to Wayne-Monroe county line	Western	765,679 00	750,687 75	270,720 00
Buffalo Dredging Co	Sept. 23, 1910	Contract No 50, Water-supply — Dam, waste-gates and spillway at Hinckley	Middle	1,076,000 00	963,415 00	76,220 00
Alto Construction Co	Dec. 23, 1910	Contract No. 51, Water-supply — Feeder between Trenton Falls and Nine-Mile creek	Middle	424,710 00	389,842 50	56,650 00
The Hunkin-Conkey Construction Company	Dec. 13, 1909	Contract No. 54, Champlain canal — Lock No. 7 at Fort Edward	Eastern	232,908 00	250,590 10	56,850 00
Arthur McMullen	Oct. 19, 1908	Contract No. 55, Water-supply — Delta reservoir	Middle	1,014,525 00	929,836 00	815,800 00
Empire Engineering Corporation	Aug. 6, 1908	Contract No. 60, Erie canal — Near South Greece to near Adams Basin	Western	1,267,301 00	1,489,247 83	1,184,160 00
Cleveland & Sons Co	Oct. 13, 1908	Contract No. 61, Erie canal — Near Adams Basin to Monroe-Orleans county line	Western	1,000,219 00	1,088,890 03	577,240 00
I. M. Ludington's Sons, Inc	Aug. 11, 1910	Contract No. 62, Erie canal — Monroe-Orleans county line to Eagle Harbor	Western	2,151,470 00	2,347,836 00	587,330 00
H. S. Kerbaugh, Inc	June 3, 1910	Contract No. 63, Erie canal — Wayne-Monroe county line to Kings Bend	Western	2,184,083 00	2,045,826 90	591,220 00
Empire Engineering Corporation	Aug. 6, 1908	Contract No. 64, Erie canal — Near Prospect street, Medina, to near Gasport	Western	1,207,930 00	1,335,433 78	695,080 00
Empire Engineering Corporation	Sept. 22, 1908	Contract No. 66, Erie canal — Near Gasport to near locks at Lockport	Western	751,039 00	821,032 72	618,870 00
Larkin & Sangster	Sept. 3, 1910	Contract No. 67, Erie canal — Locks at Lockport	Western	1,290,880 00	1,149,401 25	289,040 00
Shanley-Morrissey, Inc	Nov. 23, 1908	Contract No. 68, Champlain canal — Locks at Mechanicville, Stillwater and Northumberland	Eastern	1,175,623 00	1,042,735 60	920,420 00
I. A. Hodge & Co., Inc	Dec. 11, 1909	Contract No. 69, Champlain canal — Lock at lower Mechanicville	Eastern	270,675 00	240,061 00	156,330 00
Shanley-Morrissey, Inc	Jan. 11, 1910	Contract No. 70, Champlain canal — Hudson river, Waterford to lock No. 1	Eastern	749,300 00	779,636 50	216,770 00
Shanley-Morrissey, Inc	Jan. 11, 1910	Contract No. 71, Champlain canal — Hudson river, lock No. 1 to lower Mechanicville	Eastern	1,502,100 00	1,561,119 00	646,780 00
Shanley-Morrissey, Inc	Dec. 14, 1909	Contract No. 72, Champlain canal — Hudson river, lower Mechanicville to Stillwater	Eastern	1,439,733 00	1,202,658 00	509,640 00
E. M. Graves	May 26, 1910	Contract No. 73, Champlain canal — Hudson river, Stillwater to Northumberland	Eastern	778,960 00	771,627 00	416,990 00
Rec'rs of J. B. & J. M. Cornell Co.	Mar. 1, 1910	Contract No. 75, Erie canal — Guard-gate superstructures on contracts Nos. 60, 61 and 64	Western	39,525 00	42,917 00	0
The T. A. Gillespie Co	Dec. 23, 1910	Contract No. 76, Erie canal — Near West Shore R. R. crossing at East Newark to about one-half mile east of Port Gibson	Western	1,504,776 00	1,512,011 00	353,260 00
The T. A. Gillespie Co	Dec. 23, 1910	Contract No. 77, Erie canal — About one-half mile east of Port Gibson to about one-half mile west of Palmyra	Western	1,790,672 50	1,669,765 50	412,600 00
Cunningham-Woodard Co	Aug. 18, 1910	Contract No. 78, Oswego canal — Dike along Oswego river near Fulton	Middle	55,154 00	49,025 95	46,360 00

* Contract relet.

TABLE OF CONTRACTS PENDING SEPTEMBER 30, 1911 — (*Concluded*).

Construction of Barge Canal — (Concluded).

Chapter 147, Laws of 1903, and amendatory laws; Chapter 391, Laws of 1909.

CONTRACTOR.	Date of contract.	Character of work.	Division.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work done to September 30, 1911.
Lupfer & Remick	Sept. 23, 1910	Contract No. 79, Oswego canal — Bridge street bridge at Oswego	Middle	$39,735 00	$37,480 00	$20,950 00
Walter Bradley	Jan. 16, 1911	Contract No. 80, Oswego canal — Dam and bulkheads at Phoenix	Middle	134,340 00	117,390 64	53,030 00
Groton Bridge Co	Dec. 7, 1910	Contract No. 82, Erie canal — Highway bridge superstructures within the limits of contract No. 21	Western	27,235 00	28,841 50	8,330 00
Lupfer & Remick	Aug. 5, 1911	Contract No. 85, Oswego canal — Lift-bridge over lock No. 1 at Phoenix	Middle	12,783 50	13,238 50	500 00
Lathrop, Shea & Henwood Co	Sept. 23, 1911	Contract No. 86, Erie canal — Reconstruction of a portion of the bridge at Canajoharie	Eastern	41,871 00	43,440 00	0
D'Olier Engineering Co	April 12, 1910	Contract No. 90, Erie, Champlain and Oswego canals — Power-supply at Baldwinsville, Smiths Basin, Comstock and Whitehall; operating equipment at lock No. 24, Erie canal, at Nos. 9, 11 and 12, Champlain canal, and at Nos. 1, 2, 7 and 8, Oswego canal	Eastern, Middle	180,630 00	180,317 94	96,950 00
The Hollington Co	Jan. 5, 1911	Contract No. 91, Erie canal — Hydro-electric power-plant at Crescent dam	Eastern	44,600 00	42,940 50	1,740 00
Scott Brothers	Dec. 30, 1910	Contract A, Cayuga and Seneca canal — Lock No. 1 and dam No. 1 near Cayuga	Middle	393,133 50	357,627 00	82,450 00
Crowell-Sherman-Stalter Co	Dec. 29, 1910	Contract B, Cayuga and Seneca canal — Dredging, Montezuma to deep water in Cayuga lake, Cayuga lake to Seneca Falls, Waterloo to Seneca lake	Middle	1,832,550 00	1,448,550 00	349,600 00

Roster of Employees in Office of State Engineer and Surveyor.

John A. Bensel, *State Engineer.*

Arnold G. Chapman, *Chief Clerk.*

GRADED EMPLOYEES.

B. J. McAllister, *Private Secretary.*

M. Peckham, Jr., *Land Clerk.*

John Allen, *Canal Clerk.*

R. V. Somerville, *Confidential Stenographer*

Mary G. Harrington, *Stenographer.*

A. M. Flanigan, *Stenographer.*

Francis Kelly, *Laborer.*

P. H. White, *Night Watchman.*

REPORT

OF THE

DIVISION ENGINEER

OF THE

EASTERN DIVISION

For the Fiscal Year Ended September 30, 1911

EASTERN DIVISION.

STATE OF NEW YORK,

DEPARTMENT OF STATE ENGINEER AND SURVEYOR,

EASTERN DIVISION.

ALBANY, *October* 2, 1911.

Hon. J. A. BENSEL, *State Engineer and Surveyor, Albany, N. Y.:*

Sir.— I have the honor to submit herewith my annual report as Division Engineer of the Eastern Division of your department, for the fiscal year ended September 30, 1911.

The chief work of this Division consists in performing the necessary engineering work in connection with the present canal system, and the making of surveys and plans, and supervising the construction of the Barge canal work.

The Eastern Division comprises that part of the canal system of the State extending from the Hudson river at Albany to the east line of Oneida county and from Troy to the south end of Lake Champlain, and covers a total of about 190 miles of navigable water.

Coöperation has been extended and assistance given to the Department of Public Works in the making of surveys, plans and estimates, when requested to do so. Surveys have been made and testimony furnished in behalf of the State before the Board of Claims, in suits brought against the State for damages resulting from leaks and breaks in the canal.

Surveys, plans, estimates and other engineering information have been furnished various other State departments, namely:

State Architect,— where work has been done in the matter of a survey of the Blauvelt Rifle Range, and information furnished relative to the work at Letchworth Village, at Thiells.

State Board of Charities,— survey for the Bedford Reformatory.

State Prison Commission,— complete topographic survey of the State Farm for Women at Valatie.

State Lunacy Commission,— topographic survey of the Middletown State Hospital site and Mohansic State Hospital site.

State Reservation Commission at Saratoga,— topographic survey covering all the spring properties in the reservation, together with individual maps of appropriation.

State boundary line surveys, chapter 513, Laws of 1910, were completed during the first part of the fiscal year, the work being done with a force from the Division under the direction of the Deputy State Engineer.

MAPPING OF CANAL LANDS.

(Chapter 199, Laws of 1910.)

The work in connection with the relocating, by the placing of monuments on the ground, of the blue line, so called, showing the limitations of the State canal property, has progressed satisfactorily, and is a work that has been greatly needed. The work being done will be of great value to the State. The need for monumenting the State blue line along the canal has been evident for years. It is not only of great assistance to this Department, but to the abutting property owners, to definitely know where the property lines are located. Doubtless the appropriation for this work will be exhausted in the early part of 1912, and I would recommend to you that provision be made for continuing this work without interruption from appropriations which can be provided by legislative enactment.

THE MINISCEONGO BRIDGE PIER PROTECTION.

(Chapter 513, Laws of 1910.)

Plans and specifications were prepared by this Department, providing for the reconstruction and protection of the pier at the existing draw bridge from Minisceongo creek at Stony Point, Rockland county, N. Y.



BARGE CANAL, CONTRACT No. 2–E.
View near Waterford, showing completed lock No. 3 and by-pass.

THE IMPROVEMENT OF THE CHANNEL AND BANKS OF THE WEST CANADA CREEK, HERKIMER.

(Chapter 132, Laws of 1911.)

Surveys, plans, specifications, etc., were prepared for this improvement and the work was placed under contract. Now it is in the course of execution.

BARGE CANAL.

(Chapter 147, Laws of 1903, and amendatory laws.)

To show what has been accomplished in constructing the Barge canal during the fiscal year, reports from the several Resident Engineers in charge of the residencies of this Division are appended to my report.

APPENDED TABLES.

Tables showing the engineering expenses of the Division for the fiscal year and other tables giving the contracts in force during the year, both completed and still pending, will also be found appended to my report.

Respectfully submitted,

JOHN A. O'CONNOR,
Division Engineer.

APPENDED REPORTS.

Resident Engineers' Reports on Barge Canal Construction.

Erie Canal, Residency No. 1.

Resident Engineer H. O. Schermerhorn reports:

This residency includes that section of the Erie canal extending from the Congress street bridge at Troy to the lower Mohawk aqueduct at the village of Crescent. Beside the general office work, several miscellaneous maps of appropriation parcels on contract No. 14 have been prepared and some revisions of maps made. Work was continued on the final estimate of contract No. 2, which has now been completed. The principal work, however, has been confined to the continuation of construction operations on contracts Nos. 2-E, 11, 33 and 91.

Contract No. 2-E.

Construction operations on this contract continued more or less during the entire year. During the greater part of the winter, concrete was placed in the by-pass at lock No. 3 and in the north prism retaining wall below lock No. 2. During this season only miscellaneous items of work have been done, above lock No. 2 — this work consisting of making closures in walls, building of catch basins and drains, trimming and grading of embankments, slopes, etc. Below lock No. 2, a dredging outfit has been in operation since early in the spring. Much of the material removed was placed as embankment behind the north retaining wall above lock No. 2 and the remainder as embankment behind the timber crib below lock No. 2. The dredging work and building of crib has been very slow and indications are that this end of the contract will not be completed before January 1, 1912. A nine-inch concrete lining was built in the by-pass at lock No. 3, under an altera-

tion order. The principal items of work performed during the year were: Excavation, 32,000 cu. yds.; embankment, 23,000 cu. yds.; round timber in cribs, 28,000 lin. ft.; second-class concrete, 7,800 cu. yds. The total amount of work done to date and the amount done during the fiscal year are given in the table below. The present indications are that the contract will be completed at about 90 per cent of the cost as figured from the preliminary estimate.

The work on this contract has been under the direction of O. Hasbrouck, Assistant Engineer, and since April 1 under G. W. Stickney, Assistant Engineer.

ITEMS OF WORK.	Preliminary estimate, as affected by alterations Nos. 1, 2, 3 and 4.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
All excavation.....cu. yds.	141,035	31,854	107,990	22.6	76.6
Sheeting and bracing.....ft. B. M.	26,400	23,400	28,500	Finished	Finished
Forming embankment.....cu. yds.	68,410	23,396	50,828	34.2	74.3
Lining.....cu. yds.	790	635	754	Finished	Finished
Timber and plank.....ft. B. M.	148,500	59,500	79,500	40.0	53.5
Spruce, timber and plank.....ft. B. M.	1,000	0	900	0	Finished
Round timber in cribs.....lin. ft.	51,300	28,460	28,460	55.5	55.5
Foundation piles, 15 ft. long.....No.	2,015	298	1,451	Finished	Finished
Mooring piles, 20 ft. long.....No.	14	9	9	64.3	64.3
Second-class concrete.....cu. yds.	21,912.5	7,238	20,777	33.0	94.8
Wash wall.....cu. yds.	1,065	812	812	76.2	76.2
Stone filling.....cu. yds.	5,540	2,945	2,945	53.2	53.2
12-in. vitrified pipe.....lin. ft.	88	0	0	0	0
Iron castings.....lbs.	17,330	11,452	12,578	66.0	72.6
Structural steel.....lbs.	23,825	17,114	21,567	71.8	90.5
White oak in miter-sills.....ft. B. M.	3,150	100	2,740	3.1	87.0
Cobblestone gutters.....sq. yds.	125	80	105	64.0	84.0
Relaying old flagging.....sq. ft.	960	696	696	Finished	Finished
Fender fastenings.....No.	460	281	406	61.1	88.3
Brick sidewalks.....sq. yds.	62	62	62	Finished	Finished
Stone curbs.....lin. ft.	125	140	140	Finished	Finished
Stone curbs, reset.....lin. ft.	95	94	94	Finished	Finished
Cobblestone gutters, relaid.....sq. yds.	75	0	0	0	0
Crosswalks, relaid.....sq. yds.	75	74	74	Finished	Finished
Change in hydrant and connections...lump sum	$45	0	$45	Finished	Finished
Change in steps and stoops.....lump sum	$100	$100	$100	Finished	Finished
Removing concrete.....cu. ft.	304	213	213	Finished	Finished
Dressing concrete surface.....sq. ft.	130	113	113	Finished	Finished
Cast iron expansion-plates.....lbs.	9,470	3,669	9,673	Finished	Finished
24-in. vitrified pipe.....lin. ft.	260	230	230	Finished	Finished
Portland cement sidewalk.....sq. ft.	1,930	440	440	22.8	22.8
Crosswalks.....sq. ft.	250	229	229	Finished	Finished
Wooden fence.....lin. ft.	200	0	0	0	0
Iron fence.....lin. ft.	235	231	231	Finished	Finished
Treating fenders.....lin. ft.	4,610	0	3,240	0	70.3
Gravel concrete.....cu. yds.	56	54	54	Finished	Finished
Gravel concrete No. 2.....cu. yds.	560	511	511	91.3	91.3



BARGE CANAL, CONTRACT NO. 2–E.
View of completed canal, looking towards lock No. 2, at Waterford.



BARGE CANAL, CONTRACT NO. 2–E.
View of completed canal, looking towards lock No. 3, at Waterford.

Withdrawn

Contract No. 11.

Active construction work continued on this contract until December 1, 1910, after which date only one steam-shovel and rock-channeling machine operated until spring, when concrete work was again started.

The amount of excavation done during the year has been very small, on account of the difficulty of placing material in the several embankments. The entire output of one shovel has been handled by teams and drawn to several embankments. The Vulcan shovel remained on the level above lock No. 6 and removed 32,000 cu. yds. This material was placed in spoil banks Nos. 1 and 2, in embankment at lock No. 6, along core wall at lock No. 6 and behind the south retaining wall above lock No. 6. The Bucyrus shovel removed the bulk of remaining excavation from the prism below lock No. 4, in by-pass and spillway at lock No. 4, in by-pass and spillway at lock No. 5 and in by-pass at lock No. 6. All the excavation from this shovel was handled by teams.

About 6,500 sq. ft. of rock channeling was done on the south side of the canal prism through the rock cut. Progress on this item of work has been very slow, due chiefly to the constant breaking down of the machine.

During the year about 23,400 cu. yds. of concrete have been placed, the following structures having been completed: Prism walls below lock No. 4, lock No. 4, spillway at lock No. 4, lock No. 6, core wall at lock No. 6, north docking above lock No. 6, north and south prism walls between rock cuts above lock No. 6 and guard-gate. In addition to this the greater part of the following concrete structures have been finished: Spillway at lock No. 5, south wall above lock No. 6 and south retaining wall west of the guard-gate.

Work on this contract has not progressed at a satisfactory rate during the year. Had a suitable force been employed during the past summer season, the work would have been completed by May, 1912.

The work on this contract has been under the direction of E. J. Becker, Assistant Engineer, during the entire year.

The following table gives a statement of total work done to date and amount of work done during the fiscal year:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations Nos. 1, 2, 4 and 5.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		0	90%	0	90.0
Grubbing.....cu. yds.	15,000	0	8,094	0	Finished
All excavation.....cu. yds.	801,670	53,968	658,832	6.7	82.1
Sheeting and bracing.....ft. B. M.	200,000	24,009	247,967	12.0	123.9
Rock channeling.....sq. ft.	96,000	6,489	65,367	6.7	68.0
Embankment, first-class.....cu. yds.	116,300	6,137	80,687	5.2	69.3
Embankment, second-class.....cu. yds.	275,000	25,789	210,164	9.3	76.3
Lining.....cu. yds.	6,290	0	2,245	0	35.7
Spruce lumber.....ft. B. M.	129,500	0	0	0	0
White oak lumber.....ft. B. M.	9,600	1,460	8,560	15.2	Finished
Foundation piles, 15 ft. long.....No.	89	0	75	0	Finished
Foundation piles, 20 ft. long.....No.	261	0	258	0	Finished
Concrete.....cu. yds.	162,580	23,359	143,726	14.3	88.4
Wash wall.....cu. yds.	12,000	0	0	0	0
12-in. vitrified pipe.....lin. ft.	290	0	0	0	0
Back filling.....cu. yds.	290	0	0	0	0
Cobblestone paving.....sq. yds.	600	0	0	0	0
Steel castings.....lbs.	20,000	0	18,692	0	Finished
Iron castings, plain.....lbs.	370,330	46,730	306,512	12.6	82.7
Iron castings, machined.....lbs.	90,100	0	84,072	0	Finished
Structural steel.....lbs.	113,340	21,410	45,206	18.8	39.8
Metal reinforcement.....lbs.	429,600	158,383	299,347	36.8	69.6
Expansion bolts.....No.	614	0	0	0	0
¾-in. log chains.....lbs.	20,000	0	0	0	0
Pipe railing.....ft.	500	0	0	0	0
Cast iron quoin-plates.....lbs.	46,000	3,353	46,508	7.2	Finished
Removing concrete.....cu. yds.	216	0	188	0	Finished
Dressing concrete.....sq. ft.	100	0	91	0	Finished

Contract No. 33.

This contract provides for installing all needle-beams, lock-gates and lock-valves on the Waterford flight of locks and also for the erection of a guard and sluice-gate at the Mohawk river at the west end of contract No. 11.

Construction operations began about November 1, 1910, and have continued without interruption to date. Work was commenced on lock No. 2 and thereafter progressed along the line at locks Nos. 3, 4, 5 and 6. Work on the guard and sluice-gates was commenced about December 1, 1910, and finished April 1, 1911. All work has been completed at locks Nos. 2, 3, 4 and 5 and practically all at lock No. 6. The dismantling of plant and general cleaning up of the various locks is in progress and the entire work will no doubt be ready for final inspection in November.

The Waterford work comprises only a part of this contract and therefore a table showing the amount done is not appended. The



BARGE CANAL, CONTRACTS NOS. 11 AND 14.

View at the entrance into the Mohawk river of the land line which emerges from the Hudson river at Waterford. Across the river a little below the canal junction, the Crescent dam is seen, stretching along a semicircle nearly 2,000 feet in length.

Main

total percentage done during the year of that portion of this contract located at Waterford has been about 98 per cent.

The work at locks Nos. 2 and 3 has been under the supervision of O. Hasbrouck and G. W. Stickney, Assistant Engineers, and at locks Nos. 4, 5 and 6, and guard and sluice-gates under E. J. Becker, Assistant Engineer.

Contract No. 91.

This contract provides for the construction and electrical equipment for a power-house at the east end of the Crescent dam. The contract was awarded January 5, 1911, to the Wells-Boughton Co. and on April 1, 1911, work of excavating commenced. On account of unsuitable and inefficient plant and management the work progressed very slowly. After the excavation reached the water line, progress was practically brought to a standstill, on account of poor coffer-dam construction. At the present time the contractor is still endeavoring to unwater the coffer-dam with little success. From present conditions no prediction can be made as to the time of completion of this contract. About 1,200 cu. yds. of excavation have been completed — this being the only work performed.

The contract has been under the supervision of E. J. Becker, Assistant Engineer.

ERIE CANAL, RESIDENCY NO. 2.

Resident Engineer Carleton Greene reports:

This residency extends from dam No. 2, Crescent (previous reports state that it extends from the west end of the aqueduct over the Mohawk river at Crescent, which appears incorrect, as dam No. 2 is a mile below this aqueduct) to old lock No. 27, west of Cranesville.

Within the limits of this residency are located contracts No. 8, No. 36 and portions of No. 14.

Contract No. 8.

This contract is for building three locks and three movable dams.

Dam No. 4, *Lock No.* 8, *Scotia.* There has been no contract work at this place during 1910–11. Borings have been made by engineers under direction of the Consulting Engineers.

Dam No. 5, *Lock No.* 9, *Rotterdam.* The pier-shafts and south span of apron were completed early in the year. Embankment was placed behind the south abutment and 60 per cent of the paving (30 per cent consisting of concrete slabs) were completed, on the south shore protection. Paving (consisting of concrete slabs) and riprap protection at the lock were put in place. 90 per cent of the riprap at the north dike has been completed. Parts of the coffer-dams have been removed from the river. The superstructure for the movable dam has been partially erected during the year and the dam will be completed early in 1912.

Dam No. 6, *Lock No.* 10, *Cranesville.* Paving (consisting of concrete slabs) and riprap protection at the lock have been put in place and completed. The defective concrete in the lock walls is being repaired.

Contract No. 14.

Dam No. 2, *Crescent.* During 1911 the three sections left open in the land dam, dam "B," were closed and the sections at the east end of dam "C" and a portion of abutment "C" adjacent were completed. Embankment was placed behind the abutment of the dams and considerable miscellaneous work finished up. Crescent dam is now completed, except for the final closure of the six sections left open in dam "A" to pass the flow of the Mohawk river.

Dam No. 3, *Lock No.* 7, *Vischer's Ferry.* The excavation of the prism channel below the lock has been practically finished between Stas. 810 and 835, two scraper-towers doing most of the work. Riprap and wash wall protection are being placed on the breakwater below the lock and wash wall on the slopes of the lower prism and approach and on the upstream side of the core wall embankment. The lock-valves have been installed and the needle-dams and lock-gates adjusted. The lock is practically completed. The earth dam with concrete core wall, forming the cut-off south of the lock, has been built and nearly completed and the remaining sections of the timber cribs and concrete upper approach walls are



BARGE CANAL, CONTRACT NO. 14.
View of completed eastern portion of Vischer's Ferry dam, showing also the head gates at the farther end.

Page

being constructed. The excavation on the island for the middle section of the dam has been finished, except for a small distance at the north end. No work has been done on the south or north channel dams; the south section has nine sections left open above elevation 185, to pass the flow of the river; the north section was completed in 1910. Seven head-gates were put in place, to be used for the development of power from the surplus water, also the guard-gate for the use of the present Erie canal and for the protection of this canal in case of floods in the Mohawk river. Steel work for the lift-gate is now being erected.

Highways near Crescent. The excavation, embankment, lining and guard-rail on the highway along the tow-path between Crescent dam and Crescent aqueduct have been completed and the road opened for travel. The small amount of work necessary to complete the Crescent-Middletown and Lower Aqueduct-Crescent Station roads is now being done.

Right of Way. The work of resurveying and monumenting the lands appropriated by the State inside the flow lines of the pools to be formed by the dams at Crescent and Vischer's Ferry, has been about 75 per cent completed.

Inspection of Cement. Cement for use on this and other residencies shipped to Schenectady has been reshipped and the transfer and reshipment supervised.

Removal of Bodies. A contract to be known as No. 14-R, for the removal of bodies from cemeteries located within the flooded area of contract No. 14 to new burial plots outside the flow lines, is under preparation and will be let before the end of the year.

Claims. A considerable number of claims against the State, arising from damages from floods and from the appropriation of land, have been investigated and reported on.

Engineering Force. I desire to commend the general efficiency of the engineering force on the residency during the year, and especially that of W. J. Weigmann, Assistant Engineer, in charge of contract No. 8, J. C. Bell, Assistant Engineer, in charge of contract No. 14, and S. R. Bellows, Leveler, in charge of Cohoes-Crescent highway and other work at Crescent.

ERIE CANAL, MOHAWK RIVER RESIDENCY, DREDGING CONTRACTS NOS. 20-B, 20-C AND 20-D; ALSO NO. 86.

Resident Engineer E. A. Lamb reports:

The residency includes contract No. 20-B, extending from Sta. 3872 + 35, the upper miter-sill of lock No. 16 at Mindenville, to Sta. 3361 + 85, the upper miter-sill of lock No. 14 at Canajoharie; contract No. 20-C, extending from the upper miter-sill of lock No. 14 at Canajoharie to Sta. 2948 + 75, the upper miter-sill of lock No. 13 at Yosts; contract No. 20-D, extending from the upper miter-sill of lock No. 13 at Yosts to deep water below the aqueduct at Rexford Flats, and also contract No. 86, for the reconstruction of a portion of the bridge between the villages of Canajoharie and Palatine Bridge. The total length of this residency, or the length of contracts Nos. 20-B, 20-C and 20-D, combined, is 54.2 miles.

Contract No. 20-B.

Working drawings traced from the mounted maps for this contract have been practically completed in this office. Surveys of the following parcels have been mapped, traced and checked and sent to the Division Engineer: J. Salem Snell, Jay Chawgo (2 parcels), Irwin Miller, Jay D. Wagner, Ezra Shultz, Mrs. J. N. Lipe (3 parcels), John Errgong (2 parcels) and H. P. Allen; also H. P. Allen (reconveyance map); surveys of some of the above named parcels were made; also surveys of land to be appropriated from the David J. Kyser estate and from Frank Perry have been made, mapped and checked and are ready to forward.

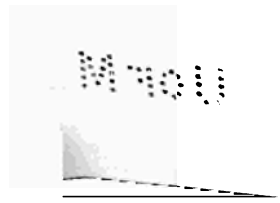
All the appropriated lands have been monumented. Range stakes and gages have been maintained for the contractor in carrying on the prism excavation. Cross-sections have been taken at the end of each month for the monthly estimates.

Elevations of the tops of stakes set about 2,000 ft. apart along the river bank between the Mindenville retaining dam and dam No. 11 at Fort Plain have been taken for the purpose of getting a



BARGE CANAL, CONTRACT NO. 14.

View of the head gates at the eastern end of Vischer's Ferry dam. At the gap there is to be built a small lock for the passage of boats on the existing canal.



profile, or slope, of the river between the dams, when the river is at high navigable stage at pool with the dam in place and at low water with the dam not in place. From this data, in connection with a series of current-meter measurements, it is hoped to get some valuable information and records.

On the north side of the river below Fort Plain, the stripping and drilling and blasting of the ledge rock in the prism has been completed. Early in the year, after the hydraulic disposal boat was finished, it was moved with the dipper dredge west of the St. Johnsville highway bridge and a preliminary test of its efficiency was made. Owing to the extreme cold weather, about December 5, 1910, after having placed on the N. Y. C. R. R. spoil area located between the Fort Plain railroad station and the river about 14,000 cu. yds. of excavation, this plant was moved into lock No. 16 for the winter.

The plant in operation during the season, doing the prism excavation, consisted of two dipper dredges, one hydraulic disposal boat with pontoon line, one orange-peel dredge, one steam tug, one large and four small rock scows, one coal scow and one 10-ton crane with orange-peel bucket.

From opposite the retaining dam at Mindenville, about Sta. 3890, to Sta. 3856 the prism is practically finished. During the year more or less prism excavation has been done from the St. Johnsville highway bridge to Sta. 3856, the prism excavation for the year being nearly 226,000 cu. yds. The excavated material from the prism has been placed in spoil along the north side of the river, levees being thrown up and the fine material being pumped to this area by means of the pump and pipe line of the disposal boat and the coarse material, larger than six inches, being placed along the face of the river bank. In many places the stone facing the prism slope reaches as far down as the canal grade.

The stream entrance work has been completed at Klock creek and at Caroga creek. At Caroga creek concrete was used in place of nearly all the fourth-class and all of the first and second-class riprap and paving.

The total work done to October 1, 1910, on this contract was $9,260. At that time approximately 1 per cent of the contract

was completed. On October 1, 1911, $33,480 worth of work has been completed on this contract, or 17 per cent of the contract is completed.

To sum up, practically 16 per cent of the work on this contract in money value, has been done during the fiscal year ended September 30, 1911.

The following table shows the amount of work done during the year and the total to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		15%	45%	15.0	45.0
Excavation.....cu. yds.	1,428,000	232,318	243,856	16.0	17.0
Lining.....cu. yds.	360	4	32	1.0	9.0
First-class paving.....sq. yds.	1,600	480	738	30.0	46.0
First-class riprap.....cu. yds.	550	164	206	30.0	37.0
Second-class riprap.....cu. yds.	600	123	149	20.0	25.0
Third-class riprap.....cu. yds.	600	22	124	4.0	20.0
Fourth-class riprap.....cu. yds.	1,600	421	570	26.0	36.0

Contract No. 20-C.

Working drawings for this contract traced from the mounted maps have been practically completed in this office. Surveys have been mapped, traced and checked and sent to the Division Engineer of the following parcels: Adam Schlotzhauer, Canajoharie Water Supply Co., Chas. Paulfuse, Edmond S. and Ada Pierce Fish, Frederick Minister, Francis F. Vedder, Henrietta Lussa, Florence M. Keck, Elizabeth Russ, Geo. Kelly, Oscar Van Evra and Luke Lasher, and also temporary appropriations from Elizabeth Russ, Geo. Kelly, Oscar Van Evra and Luke Lasher, and all of these parcels have been properly monumented. Original cross-sections ahead of the dredge have been taken and the necessary range stakes, etc., have been set from the Canajoharie highway bridge to about Sta. 3170.

From Sta. 3174 + 25 to about Sta. 3340 more or less prism excavation has been done. From at least as far east as Sta. 3194 to Sta. 3289, the prism excavation has been practically completed, except a few hundred feet along the north shore, which is to be



BARGE CANAL, CONTRACT No. 8.
View of paving consisting of concrete slabs, for shore protection at the movable dam at Rotterdam.



BARGE CANAL, CONTRACT No. 20–C.
View of a dipper dredge excavating channel at Amsterdam and loading into cars running upon a dike.

taken out with the dipper dredge, the material being too hard to be excavated with the hydraulic dredge.

Between Stas. 3248 and 3287 the prism has been excavated four feet below grade and hard material is to replace the four feet in depth of soft sand. (This is according to special specifications No. 15s.) Nearly all the excavation made by the dipper dredge has been conveyed in dump scows and dumped between these stations. The material excavated by the hydraulic dredge has been spoiled about 350 feet wide north of the Erie canal tow-path from a few hundred feet west of the ferry road to as far as this width between the canal and the river will allow; also on the large spoil area located north of the Erie canal tow-path appropriated from Charles Paulfuse, on the back channel back to the Richmond and Minister islands and on the Adam Schlotzhauer parcels.

The total excavation for the year on this contract has been 614,298 cu. yds.

The total work done on this contract to October 1, 1910, was $7,640. At that time approximately 1.3 per cent of the contract had been completed. On October 1, 1911, there is $324,260 worth of work done on this contract, making a total of 55 per cent completed to this date.

The sum up, practically 53.7 per cent of the work on this contract, in money value, has been done during the fiscal year ended September 30, 1911.

The following table shows the amount of work done during the year and the total to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		80%	80%	80.0	80.0
Excavation.....cu. yds.	1,100,000	614,298	629,286	56.0	57.0
First-class paving.....sq. yds.	2,500	344	344	14.0	14.0
First-class riprap.....cu. yds.	700	104	104	15.0	15.0
Second-class riprap.....cu. yds.	700	150	150	20.0	20.0
Third-class riprap.....cu. yds.	400	74	74	18.0	18.0
Fourth-class riprap.....cu. yds.	2,600	255	255	10.0	10.0

Contract No. 20-D.

The appropriation surveys have been made, computed, mapped and sent to the Division Engineer for the following parcels; Geo. I. Herrick, Vito Grecco, Chas. Windbiel, Chas. H. Kemeter, Geo. Engle, Anna Morris, Frank Riccitell, Dominico Falduto, Chas. Hendershot, Frank Medici, Patrick Hogan, Chas. Christman, Asenath Vedder, Annie Gardinier, Anna Liddle, Shuttleworth Dyeing Co., John Taylor, Orin Stairs, Christian Thiener, Arnrew Cherico, Carlo Dirosa, Vincenzo Faoare and Mary L. Sorrentine. All but seven of these parcels have been monumented. Original cross-sections of the river for prism excavation have been taken between Stas. 1053 and 1060, between Stas. 2147 and 2208 and between Stas. 2452 and 2459. Extra cross-sections were taken and computations made of the amount of coffer-dam material left by Alexander Murdoch on contract No. 17, but within the prism lines of contract No. 20-D.

At the aqueduct, the American Pipe and Construction Co., contractors, installed an air compressor plant, a gravity cableway, a 6-inch centrifugal pump, a narrow gage railway, storehouses and about 800 ft. of stone filled crib coffer-dam, besides 500 ft. of flash boards on the State dam. They began operations there and with the exception of about three weeks delays in June, due to high water, the work continued to October 13, 1911, when, on account of high water, the work was closed for the season. Some 5,132 cu. yds. of loose and solid rock was removed on the south side of the prism between Stas. 1053 and 1060, and 1,078 cu. yds. of the rock spoil were sold to the Acme Engineering and Contracting Co., for use on contract No. 14 at Vischer's Ferry.

Early in March, at Amsterdam, the Mohawk Valley Boat and Machine Co. began the construction of the hull for a dipper dredge. The dredge was launched April 19, and machinery installed and ready to operate May 16, 1911, when it was turned over to the American Pipe and Construction Co. Except for short delays, the dredge has continued operations. This dredge is 40 ft. by 90 ft.; draws about 5 ft. of water; has a 125-hp. boiler,

and a 2½-yard dipper, with a reach of 60 ft. from the center of the boat. The machinery was built by the Marion Steam Shovel Co. of Marion, Ohio.

In excavating a channel between Sta. 2173 and dam No. 7, about 116,570 cu. yds. have been removed from the prism and spoiled on Gardinier islands and the spoil area on the north bank of the river. This dredge also removed for the Alexander Murdoch Co. 7,028 cu. yds. of material in coffer-dams.

During May, 1911, the contractors constructed a tower scraper with tower 80 ft. high and a 60-hp. hoisting engine and a 1¾-yard scraper, to be used in connection with the dipper dredge in pulling back material cast over by the dredge into spoil area on the north bank of the river.

Besides this, the contractors have built a blacksmith shop, storehouses, office, etc., and have used 3 dinkeys, 13 dump cars, 1 spreader car and about one mile of 3-ft. gage tracks in conveying material from dredge to spoil banks, also three scows and a tug boat.

At Tribes Hill the P. A. Breglio Co. took up the work abandoned by the Mohawk Engineering and Contracting Co., beginning work about November 1, 1910. They repaired the old coffer-dam with sand bags and started five steam drills. About 25 yards of rock were removed and drilling and blasting continued until stopped by high water about January 2, 1911. Work was resumed on May 20. During the summer 670 cu. yds. of rock were removed between Stas. 2440 and 2447 and 23 cu. yds. of second-class concrete placed in small dike above the river wall of lock no. 12.

The Breglio Co. used 7 steam drills, one 80-hp. boiler, one 3-drum 40-hp. hoist engine, one Page bucket, one orange-peel with derrick, a 1½-cu. yd. concrete mixer, storehouses, blacksmith shop, etc., and at the height of the season employed about 30 men.

The first estimate on this contract was given for May, 1911. On October 1, 1911, $62,740 worth of work, in money value, has been completed, or approximately 2 per cent of the contract.

The engineering work on this contract has been in charge of Mr. M. E. James, Assistant Engineer, with office at the Guy Park House, Amsterdam.

The following table shows the amount of work done during the year:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		8%	8%	8.0	8.0
Excavation.....cu. yds.	5,152,700	122,372	122,372	2.0	2.0
Second-class concrete.....cu. yds.	400	23	23	6.0	6.0

Contract No. 86. After some delay, this contract was awarded to Lathrop, Shea and Henwood Co., September 23, 1911, and the delivering of plant on the ground and erection of same began September 26, 1911. At the date of this report, preparations are being made for construction work. Mr. C. R. DeGraff, Leveler, has been placed in charge of this contract with office at Canajoharie.

ERIE CANAL, RESIDENCY NO. 3.

Resident Engineer Ernest D. Hendricks reports:

The limits of the residency are old lock No. 27, near Cranesville, at the east end, to old lock No. 34, near Mindenville, at the west end. The work on this residency, however, consists at the present time of that connected with contract No. 17 and those portions of contracts Nos. 14 and 36 lying within the above limits.

Surveys.

A survey has been made of one parcel of land at Canajoharie; data have been obtained for the new highway bridge at Canajoharie; river gages have been checked and concrete monuments set on the boundary lines of State lands.



BARGE CANAL, CONTRACT No. 17.

General view of the lock and movable dam at Tribes Hill. The gates and uprights are all raised, ready for winter and flood conditions.

Office Work.

Work on the final estimate has progressed during the year as follows: The estimate for contract No. 17 is practically complete, except for minor changes. The estimate for contract No. 14 has been advanced as far as the actual work of the contractors would permit.

Contract No. 17.

The work on this contract, which includes the construction of dam No. 7, lock No. 11, at Amsterdam and dam No. 8, lock No. 12, at Tribes Hill, has been advanced steadily by the contractor, Alexander Murdoch. On October 1, 1911, 99.4 per cent of the actual work was completed.

Dam No. 7, Lock No. 11. The middle span of the dam, which was in the course of construction in the fall of 1910, has been completed. This completes the concrete structures with the rip-rap protection. The bridge superstructure, including uprights, dam gates, walks, etc., have been completed by the J. B. & J. M. Cornell Co., subcontractor.

The grading and seeding, back of the lock and guide walls, has been completed in so far as the available spoil would permit. The coffer-dams above the dam have been removed to low water and those below the dam have been removed by the dredging contractors for Alex. Murdoch.

There remains to be done, the placing of the contact strips on the dam gates and the operation of these gates.

The engineering work has been in charge of Mr. M. E. James, Assistant Engineer, and party, with an office at Amsterdam.

Dam No. 8, Lock No. 12. The bridge superstructure, including uprights, dam gates, walks, etc., has been completed by the J. B. & J. M. Cornell Co., subcontractor.

The work remaining to be done at this site consists of the placing of wooden contact strips on the dam gates, the laying of plank walks on the lock gates and needle beams, the removal of coffer-dams and material deposited on the dam sill and the operation of the dam gates.

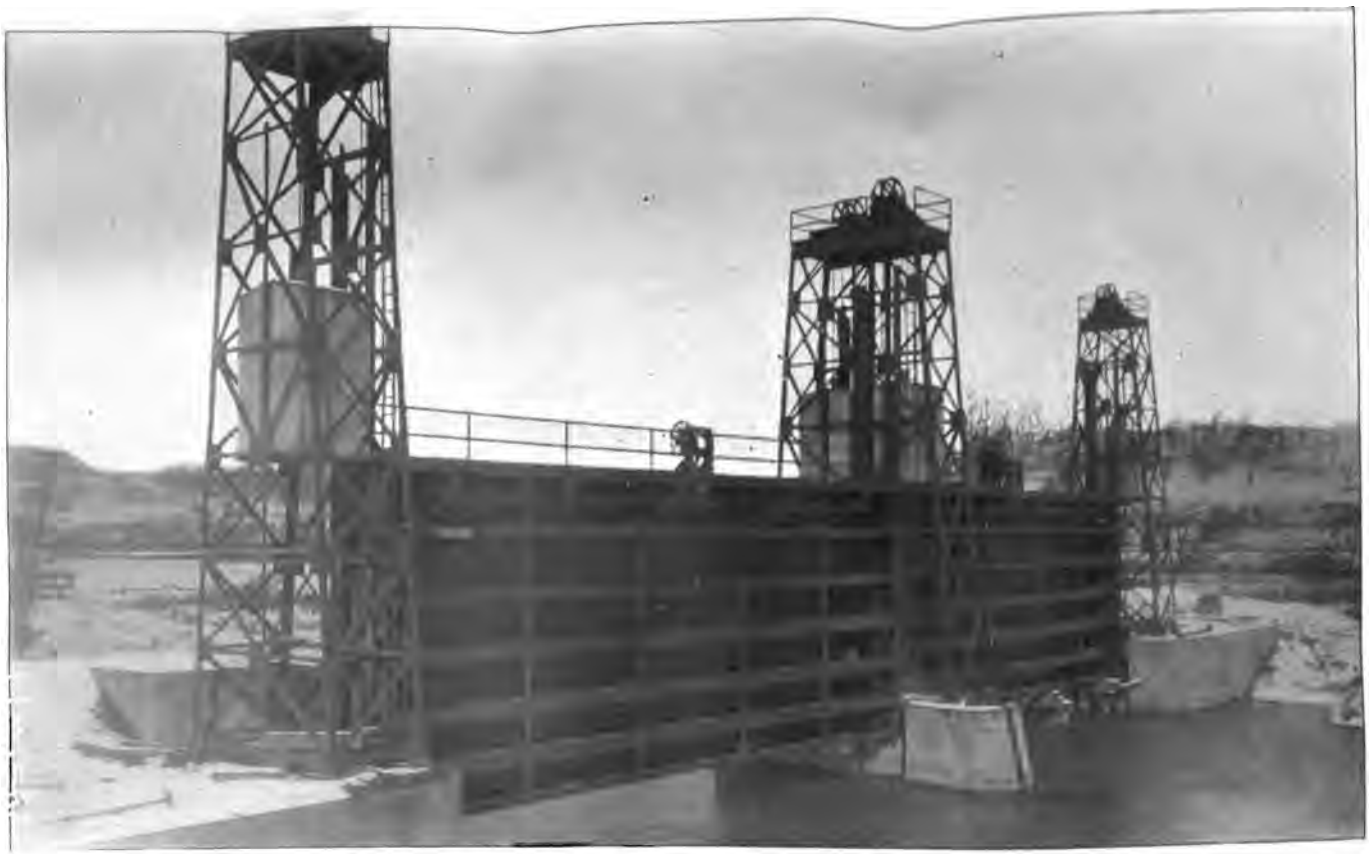
General Remarks. The contractors have employed on the work, coffer-dams, five pumps, several types of derricks, pile drivers, cars, one dinkey, teams, and an average force of 65 men.

The following table shows the amount of work done during the year and the total to date:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year by Alexander Murdoch.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$250	0	80%	0	80.0
All excavation.....cu. yds.	185,236	4,250	145,933	2.0	78.0
Drilling bolt holes in rock.....lin. ft.	150	0	100	0	Finished
Sheeting and bracing.....ft. B. M.	100,000	18,279	94,035	18.0	Finished
Forming embankment.....cu. yds.	33,000	3,327	22,048	10.0	66.0
Puddle.....cu. yds.	225	0	156	0	Finished
Sawed lumber, yellow pine.....ft. B. M.	72,000	68,054	68,054	94.0	Finished
Sawed lumber, white oak.....ft. B. M.	3,000	526	2,382	17.0	Finished
Foundation piles, 15 ft. long.....No.	547	0	495	0	Finished
Foundation piles, 16 ft. long.....No.	1,100	0	931	0	Finished
Foundation piles, 20 ft. long.....No.	500	0	342	0	Finished
Wooden sheet-piling.....ft. B. M.	75,000	0	58,418	0	Finished
Steel sheet-piling.....sq. ft.	700	0	573	0	Finished
Second-class concrete.....cu. yds.	49,977	2,029	47,282	4.0	Finished
Third-class concrete.....cu. yds.	1,794	277	1,311	15.0	Finished
Wash wall.....cu. yds.	7,000	466	5,361	6.0	Finished
Ballast.....cu. yds.	1,021	198	862	19.0	Finished
Second-class stone paving.....sq. yds.	400	346	346	86.0	Finished
Hand-laid riprap.....cu. yds.	4,200	28	3,622	1.0	Finished
First-class riprap.....cu. yds.	4,300	402	3,968	9.0	Finished
Second-class riprap.....cu. yds.	5,300	873	5,002	16.0	Finished
Fourth-class riprap.....cu. yds.	4,310	788	4,138	18.0	Finished
Iron castings.....lbs.	25,000	150	21,643	1.0	Finished
Structural steel.....lbs.	2,617,000	1,253,172	2,548,677	47.0	Finished
Metal reinforcement.....lbs.	182,247	31,625	188,407	17.0	Finished
Cast iron idlers "A".....No.	70	32	70	45.0	Finished
Cast iron idlers "B".....No.	8	4	8	50.0	Finished
Uprights for dam No. 7.....pairs	19	19	19	100.0	Finished
Uprights for dam No. 8.....pairs	16	16	16	100.0	Finished
Gates "A," "Ax," "Ay," for dam No. 7..No.	19	18.05	18.05	95.0	95.0
Gates "B" for dam No. 7.....No.	17	16.15	16.15	95.0	95.0
Gates "C" for dam No. 7.....No.	2	1.90	1.90	95.0	95.0
Gates "D" for dam No. 7.....No.	4	3.80	3.80	95.0	95.0
Gates "E," "Ex," "Ey" for dam No. 8..No.	16	15.20	15.20	95.0	95.0
Gates "G" for dam No. 8.....No.	14	13.30	13.30	95.0	95.0
Gates "H" for dam No. 8.....No.	2	1.90	1.90	95.0	95.0
Shoes for uprights, dam No. 7.....No.	38	14	38	36.0	Finished
Shoes for uprights, dam No. 8.....No.	32	0	32	0	Finished
Wrought iron chains.....lbs.	141,000	108,549	140,111	77.0	Finished
Upper lock-gates, complete with anchorages.....No.	4	0.47	3.95	11.0	99.0
Lower lock-gates, complete with anchorages.....No.	4	0.02	3.95	1.0	99.0
Needle-dams, complete with anchorages...No.	4	0.02	3.90	1.0	98.0
Supports for valve-seats.....No.	8	0	8	0	Finished
Lock-valves with seats, tracks and guides..No.	8	2.10	8	26.0	Finished
Wrought iron pipe railing.....ft.	3,000	3,053	3,053	101.0	Finished

Contract No. 14, *Section* 3.

The work on this contract includes the construction of dam No. 9 and lock No. 13 at Yosts, dam No. 10 and lock No. 14 at Canajoharie, dam No. 11 and lock No. 15 at Fort Plain and retaining dam at Mindenville. The contractors, the Acme Engineering and Contracting Co., have advanced the work during the year as follows:



BARGE CANAL, CONTRACT NO. 31.
View of the Rocky Rift guard-gate.

Dam No. 9 and Lock No. 13 at Yosts. On October 1, 1910, the concrete work for the lock and guide walls was completed and about two-thirds of the embankment was in place. The sill of the south span of the dam with adjacent riprap protection was completed, together with the lower portion of the middle pier. During the year all the concrete work on this job has been completed, including the middle pier with sill of the dam and abutment. For lock No. 13 all paving has been laid; the lock-gates have been erected, swung and fitted with white oak posts and fenders and the lock-valves have been set in place. All riprap protection has been placed for the dam and north bank and the embankment and paving completed back of the north abutment. The south span of the bridge has been erected and swung. The north span is erected, but is still on false work.

There remains to be done at this site, the placing of some embankment and riprap behind the lock and guide walls, the removal of the coffer-dams for the north span and lower guide wall, the riveting and painting of the bridge and the placing of the uprights and dam gates. The subcontractor on this work has employed a hydraulic dredge, three large traveling derricks, a washing and mixing plant, cableway, cars, pumps, air compressor and traveler for erecting the bridge.

The engineering work has been in charge of Mr. H. C. Kline, Assistant Engineer, and party, with field office on the site of the work.

Dam No. 10 and Lock No. 14 at Canajoharie. During the past year the work at this place has progressed as follows: The concrete in the upper guide wall has been completed, finishing the concrete work in the lock and guide wall. The south span of the dam, the river pier and the south abutment have been completed, together with their riprap protection. Paving along the land side of the lock has been placed. The lock-gates have been erected and the lock-valves set. The two spans of the bridge have been erected and riveted.

There remains to be done, to complete the work, some embankment behind the river wall of the lock, together with paving and riprap protection, the placing of white oak on the gates, riprap protection below the south abutment, the completion of the bridge and the placing of the uprights and dam gates.

The engineering work has been in charge of Lewis Bartlett, Assistant Engineer, and party, with office in Fort Plain.

Dam No. 11 and Lock No. 15 at Fort Plain. On October 1, 1910, the contractors were engaged in completing the bridge. During the year the bridge has been completely riveted, painted and floored. The dam gates and uprights have been put in place and operated. The coffer-dams, used in building the dam sill, have been partially removed to permit the operation of the dam.

The engineering work has been in charge of Lewis Bartlett, and party, with office at Fort Plain.

Mindenville Retaining Dam. The work on this dam was completed in 1909.

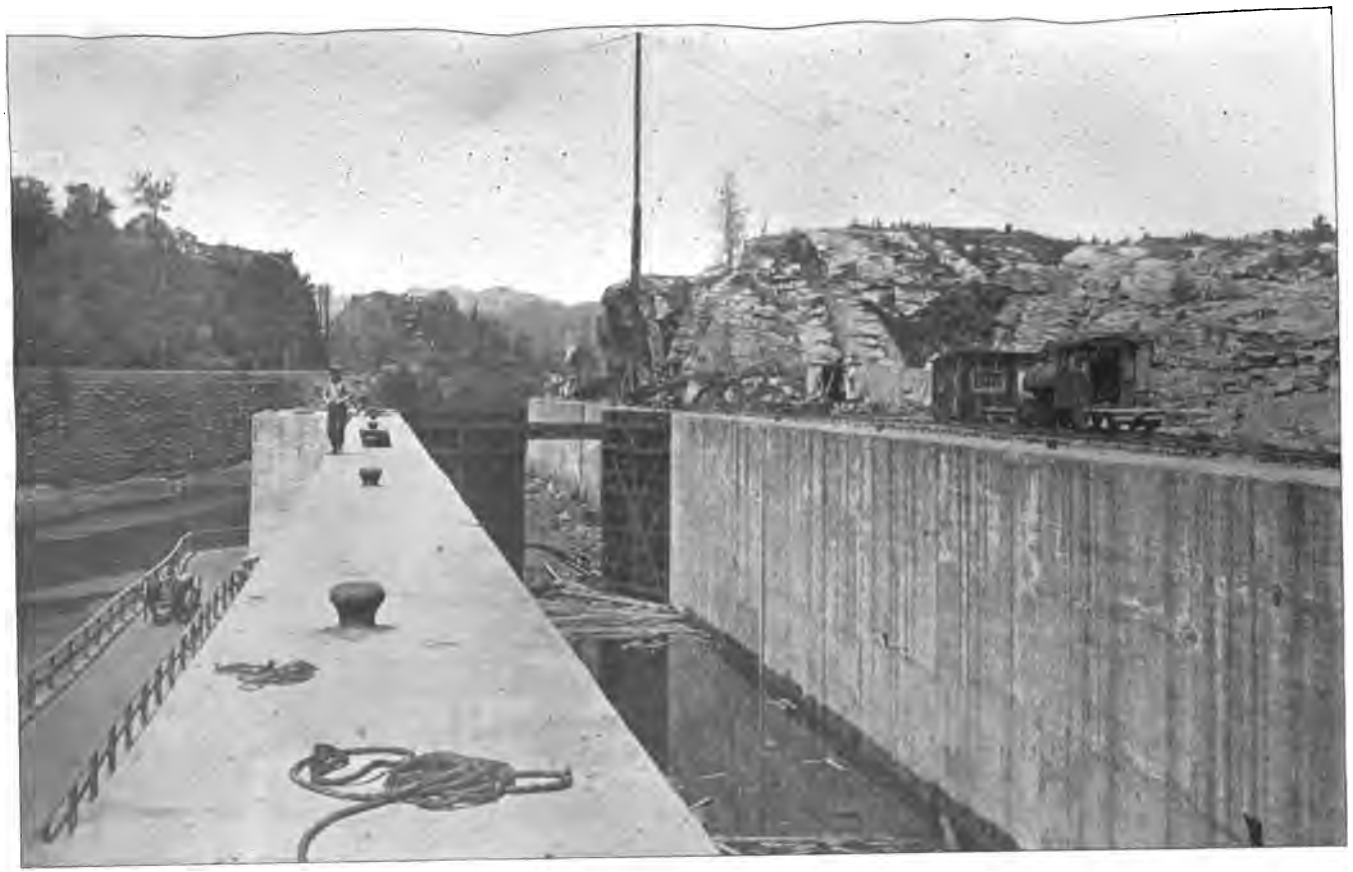
General Remarks. The work on this contract was delayed by high water in the fall of 1910. The work, however, has progressed and 93.1 per cent of the actual work to complete the contract is done.

The average force during the working season has been 150 men.

The following table shows the amount of work done during the year and the total to date:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$50	0	$40	0	80.0
All excavation.....cu. yds.	423,165	19,968	287,232	4.0	67.0
Sheeting and bracing.....ft. B. M.	83,412	781	82,241	1.0	98.0
Forming embankment.....cu. yds.	65,877	6,722	39,584	10.0	60.0
Sawed lumber, yellow pine.....ft. B. M	115,890	26,809	54,424	23.0	47.0
Sawed lumber, hemlock.....ft. B. M.	64,962	0	49,094	0	76.0
White oak in miter-sills and gates....ft. B. M.	35,100	11,094	16,651	31.0	47.0
Sawed lumber, white oak.....ft. B. M.	7,000	0	6,155	0	87.0
Creosoted yellow pine or Douglas fir..ft. B. M	15,700	7,462	7,462	47.0	47.0
Stone filling in cribs.....cu. yds.	1,400	0	1,181	0	84.0
Foundation piles, 10 ft. long.....No.	70	42	79	60.0	112.0
Foundation piles, 12 ft. long.....No.	118	44	85	37.0	72.0
Foundation piles, 14 ft. long.....No.	1,500	0	38	0	2.0
Foundation piles, 16 ft. long.....No.	2,562	196	1,665	7.0	64.0
Foundation piles, 20 ft. long*.....No.		145	338	0	0
Wooden sheet-piling.....ft. B. M.	115,270	22,368	85,824	19.0	74.0
Second-class concrete.....cu. yds.	75,199	5,942	64,730	7.0	86.0
Third-class concrete.....cu. yds.	1,280	301	793	23.0	61.0
Reinforced concrete.....cu. yds.		1	1	0	0
Second-class stone paving.....sq. yds.	3,577	1,668	2,421	46.0	67.0
Third-class stone paving.....sq. yds.	460	196	371	42.0	80.0
Ballast.....cu. yds.	2,263	806	1,399	35.0	61.0
First-class riprap.....cu. yds.	2,847	1,220	2,564	42.0	90.0
Second-class riprap.....cu. yds.	7,460	1,870	5,859	25.0	78.0
Third-class riprap.....cu. yds.	942	501	839	53.0	89.0
Fourth-class riprap.....cu. yds.	8,607	2,766	6,620	32.0	76.0
Sutrctural steel.....lbs.	2,526,966	1,232,119	2,008,298	48.0	79.0
Metal in uprights for dams.....lbs.	580,000	279,359	279,359	48.0	48.0
Metal in gates for dams.....lbs.	830,000	347,899	347,899	41.0	41.0

* Substituted for piles 16 ft. long.



BARGE CANAL, CONTRACT No. 31.

View near the upper end of lock No. 17 at Little Falls, the highest lift-lock ever built, having a lift of 40½ feet.

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Metal in lock-gates.....lbs.	566,400	298,262	469,133	52.0	82.0
Metal in needle-dams.....lbs.	246,000	28,180	140,295	11.0	57.0
Metal in lock-valves.....lbs.	69,600	44,570	44,570	64.0	64.0
Metal reinforcement.....lbs.	198,769	63,176	171,478	31.0	86.0
Iron castings, plain.....lbs.	34,900	9,557	31,035	27.0	89.0
Iron castings, machined.....lbs.	22,200	0	19,425	0	87.0
Cast iron shoes for uprights.....lbs.	86,000	27,490	82,006	31.0	95.0
Wrought iron chains.....lbs.	148,000	28,784	80,079	26.0	54.0
Wrought iron pipe railing.....lin. ft.	3,500	1,206	1,206	34.0	34.0

Contract No. 36.

This contract consists in furnishing sixteen winches for operating the eight movable dams. The first two winches were erected on dam No. 11 at Fort Plain and tested there. Since July 1, these winches have been in use in operating the dam. The work of operation has been performed by the engineering corps connected with this residency.

ERIE CANAL, RESIDENCY NO. 4.

Resident Engineer Philip H. Dater reports:

Residency No. 4 of the Erie canal extends from a point 2,400 feet east of lock No. 34 of the present canal at Mindenville, Montgomery county, to the division line between contracts No. 30 and 29, near Sterling creek and four miles east of the easterly boundary of the city of Utica. The length of the Barge canal within the limits of Residency No. 4 is 23.8 miles.

For purposes of construction the work on this residency is divided into the following contracts:

Contract No. 18. Land line from one-half mile east of Mindenville to Indian Castle. Length, 3.63 miles. Original contract price, $859,460. Amount of work completed, as allowed in final estimate, $476,978.85. Kelley Bros. Contracting Co., Syracuse, contractors.

Contract No. 20-A. Land line and dredging from Indian Castle to Little Falls. Length 4.5 miles. Contract price, $490,592.50. Houston Barnard, Rochester, N. Y., contractor.

Contract No. 31. Land line through Little Falls. Length 1.01 miles. Contract price, $829,770.43. Casey & Murray, Rochester, N. Y., contractors.

Contract No. 30. Land line and dredging from Little Falls to Sterling creek. Length 14.62 miles. Contract price, $2,591,-666.50. Acme Engineering and Contracting Co., contractors.

Contract No. 13. Superstructures for two bridges on contract No. 18 are included in this contract. Contract price for the two bridges on Residency No. 4, $12,303.50. Final estimate, $9,932.18. Penn Bridge Co., Beaver Falls, Pa., contractors.

The following contracts have not been awarded:

Contract No. 87. Bridge across the canal in the vicinity of the Rocky Rift dam. Engineer's preliminary estimate, $11,066.

Contract No. 18-A. For the completion of the unfinished portion of contract No. 18. The uncompleted work amounts to about one-quarter of the original contract. Plans are in progress.

In order to complete the Barge canal the following additional work will be required: On contract No. 31, the removal of the existing locks, the building of one lift and one fixed bridge, cut-off dam at lock No. 17 and the puddling of bottom and banks of canal between Moss and Seeley islands; on contract No. 30, constructing necessary connections between the present canal and the Barge canal between Jacksonburg and Herkimer; on contracts Nos. 18, 30 and 31, machinery for operating the locks.

The following statements show the progress made on construction work during the past year for various contracts on the residency.

Contract No. 18.

No construction work has been done on this contract during the year. In accordance with the agreement between the State and the contractors a final estimate was given for work done; amount of final estimate, $476,978.85. The unfinished work on the contract is about one-quarter of the original amount in contract No. 18. This uncompleted work will be done as contract No. 18-A, plans for which are nearly completed.

The following summary shows the amount of work put under contract, the amount to be completed under the agreement forming



BARGE CANAL, CONTRACT NO. 31.
General view of the guard-gate at Little Falls.

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alteration No. 8 and the amount actually completed and allowed in the final estimate:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.†	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$500	0	$400	0	
Grubbing.....cu. yds.	21,602	38	11,596	0.17	
All excavation.....cu. yds.	606,960	*1,912	*445,013	*	
Forming embankment.....cu. yds.	363,170	52,144	222,540	14.36	
Lining.....cu. yds.	1,727	289	1,504	16.73	
Sawed lumber.....ft. B. M.	80,300	111,735	112,817	139.15	
White oak in miter-sills.....ft. B. M.	2,000	0	1,185	0	
Sheeting and bracing.....ft. B. M.	10,000	2,403	25,203	24.03	
Foundation piles, 13 ft. long.....No.	120	0	108	0	
Foundation piles, 20 ft. long.....No.	140	0	132	0	
Second-class concrete.....cu. yds.	21,979	59.9	22,447.9	0.27	
Reinforced concrete.....cu. yds.	491	1.5	447.5	0.31	
Grouted filling.....cu. yds.	0	0	0	0	
First-class masonry coping.....cu. yds.	5	0	2.4	0	
Wash wall.....cu. yds.	3,090	0	0	0	
Cobblestone paving.....sq. yds.	1,426	1,363	1,418	95.59	
Ballast.....cu. yds.	100	1	91	1	
Third-class riprap.....cu. yds.	22	0	0	0	
Fourth-class riprap.....cu. yds.	1,022	0	549	0	
Structural steel.....lbs.	22,302	6,527	21,871	29.31	
Metal reinforcement.....lbs.	56,094	*46	*36,657	*	
Cast iron pipe, laid.....lbs.	30,170	0	0	0	
Steel castings.....lbs.	4,000	0	3,650	0	
Iron castings, plain.....lbs.	14,515	*1,008	*13,500	*	
Iron castings, machined.....lbs.	9,000	0	8,150	0	
Wooden fencing.....lin. ft.	567	0	269	0	
Upper lock-gates.....No.	2	0.06	2	3	
Lower lock-gates.....No.	2	0.02	2	1	
Upper needle-dam.....No.	1	0.02	1	2	
Lower needle-dam.....No.	1	0.02	1	2	
Lock-valves.....No.	4	0.056	4	1.4	
Removal of bridge superstructures...lump sum	$1,500	$11.70	$1,166.70	0.78	
Maintaining traffic.....lump sum	$2,000	0	$1,800	0	
Deduct for buildings removed.....lump sum	$3,000	0	$3,000	0	
Deduct for sheeting and bracing previously used.....ft. B. M.	10,343	0	10,343	0	
Second-class concrete in place of grouted filling.....cu. yds.	950	0.1	894.1	0.01	
Second-class gravel concrete.....cu. yds.	5,742	4.1	2,055.9	0.07	
ALTERATION No. 8. *Additional Contract Items.*					
Removing and placing bolts, lock No. 16, lump sum		$14	$14	100	
Piles, timber trestle, Sta. 3892.....No.		30	30	100	
Painting temporary fence, stop logs, etc., lump sum		$188	$188	100	
Seeding embankment.....lump sum		$178	$178	100	
Fence posts on approaches to bridge, 3894+31 No.		218	218	100	
Moving old bridge, 3951+12 lump sum		$100	$100	100	
Cast iron delivered.....lump sum		$3,787	$3,787	100	
Buildings retained, including storehouse purchased.....lump sum		$850	$850	100	
EXTRA WORK.					
Lining temporary canal.....cu. yds.		0	252	0	
Steel sheet-piling.....sq. ft.		0	8,000	0	
Preparing of 200 sand bags.....lump sum		0	$32	0	
Lining temporary towpath.....cu. yds.		0	1,000	0	
Widening approach, temporary canal..cu. yds.		0	2,172	0	
Laying pipe to drain water from cellars, lump sum		0	$1,144	0	
Building temporary locks near Mindenville, lump sum	$7,422	$14	$7,422	0.19	

Contract completed.

* A decrease, due to final estimate computations.

† These figures are the differences between the totals appearing in last year's report and the final estimate computations and do not represent the amount of work done during the year.

Contract No. 13.

This contract covers in part the superstructures for two highway bridges on contract No. 18. Both superstructures have been completed and final estimates prepared.

The following summary shows the amount of work put under contract and the amount allowed in the final estimate:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.†
On Contract No. 18.					
Structural steel.....lbs.	210,000	*207	*206,973	*0.09	
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	5,000	1,977	3,977	39	
Wooden pavement.....sq. yds.	550	265.1	527.6	48.25	
Setting stone coping.....cu. yds.	4	0.08	2.48	2	
Lining.....cu. yds.	4	0	2.2	0	

* A decrease, due to final estimate computations.
† All work completed.

Contract No. 20-A.

This contract begins at the western end of contract No. 18 and extends to the eastern end of contract No. 31 at Little Falls. The work includes 0.7 mile of land line at the eastern end and 3.8 miles of dredging in the Mohawk river between Rocky Rift dam and Little Falls. The contract was let on August 20, 1909, to Houston Barnard of Rochester, N. Y. During the first year of this contract only 8.5 per cent of the work was done. During the present year, earth excavation has been nearly completed for the land line section, Sta. 4062 to Sta. 4091. A 12-in. hydraulic dredge has been built and is now at work dredging the river channel about one mile east of the western end of the contract. Work completed to September 30, 1911, is 24.4 per cent. At the present rate of progress this contract should be completed within the contract time.

The engineering work on this contract is in charge of Mr. E. E. Kendall, Assistant Engineer.



BARGE CANAL, CONTRACT No. 31.
View of the guard-gate at Little Falls, showing details of construction.



BARGE CANAL, CONTRACT No. 31.
View of concrete storehouse at lock No. 17, Little Falls.

The following summary shows the amount of work put under contract and the amount done to September 30, 1911, including alterations in force:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$120	0	0	0	0
Grubbing.....cu. yds.	500	0	259	0	51.8
Excavation.....cu. yds.	588,000	96,684	148,710	16.44	25.29
Sheeting and bracing.....ft. B. M.	4,000	0	0	0	0
Round timber bracing.....lin. ft.	250	0	0	0	0
Forming embankment.....cu. yds.	7,500	1,923	1,923	25.64	25.64
Lining.....cu. yds.	100	0	0	0	0
Wash wall.....cu. yds.	6,000	0	0	0	0
First-class riprap.....cu. yds.	100	0	0	0	0
Second-class riprap.....cu. yds.	200	0	0	0	0
Third-class riprap.....cu. yds.	300	0	0	0	0
Fourth-class riprap.....cu. yds.	500	0	0	0	0
Extra Work.					
Moving bridge over R. R. feeder, Sta. 4079, lump sum		$200	$200	100	100

Contract No. 31.

This contract provides for the construction of lock No. 17, guard-gates, bridge, retaining walls and one mile of land line through the city of Little Falls, and for the construction of a movable crest on the Rocky Rift dam and the superstructure of the Indian Castle guard-gate. The contract was let on September 2, 1908, to Casey & Murray of Rochester, N. Y.

During the past year lock No. 17 has been practically completed. There remains to be done a small amount of excavation of coffer-dams at the ends of the lock and a portion of the concrete stair-way. All the steel work has been erected.

Excavation has been in progress between Stas. 4299 and 4305 and between Stas. 4311 and 4315. Only a small amount remains to be completed.

Retaining walls have been built in the vicinity of Sta. 4312 and old lock No. 39.

The guard-gate near the western end of the contract has been erected. Prism excavation at the western end has been in progress during the closed season of the old canal.

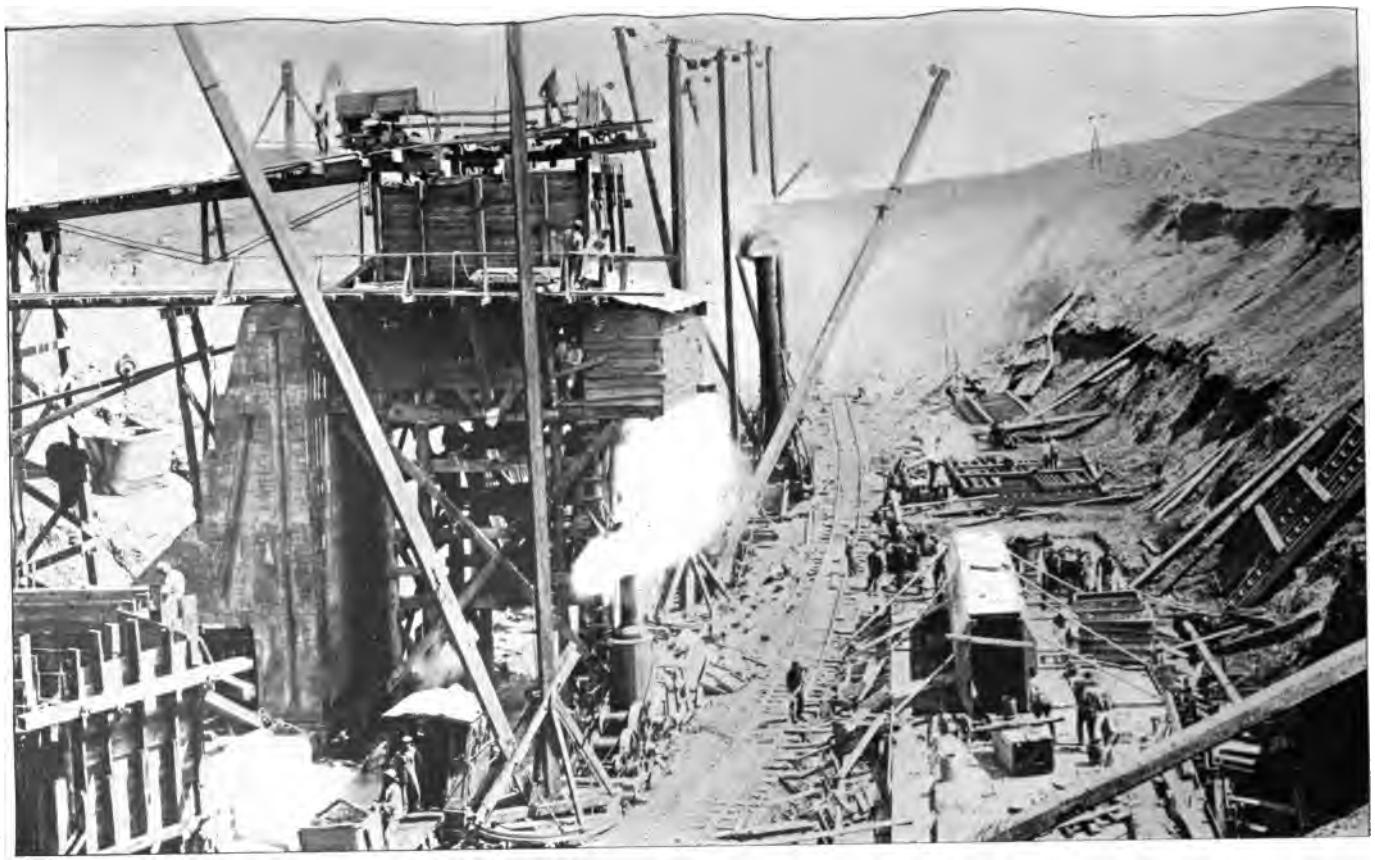
Progress on this contract has been delayed, due to the fact that the remaining work is mostly prism excavation within the limits

of the old canal. The percentage of work completed is, however, greater than the percentage of elapsed time. Work completed is 79.2 per cent.

The engineering on this contract has been in charge of Mr. E. E. Kendall, Assistant Engineer.

The following summary shows the amount of work put under contract and the amount done to September 30, 1911, including the alterations in force and extra work orders:

ITEMS OF WORK.	Preliminary estimate as affected byalterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$100	0	$100	0	100
Excavation.....cu. yds.	243,658	45,079	186,567	18.5	76.56
Removal of dam masonry.....cu. yds.	250	71	71	28.4	28.4
Round bracing.....lin. ft.	1,000	0	0	0	0
Sheeting and bracing.....ft. B. M.	30,000	0	0	0	0
Channeling.....sq. ft.	43,000	0	0	0	0
Embankment.....cu. yds.	15,800	1,455	6,885	9.29	43.58
Lining.....cu. yds.	3,320	1,306	2,229	39.34	67.14
Puddle.....cu. yds.	740	51	513	6.89	69.32
Sawed lumber.....ft. B. M.	76,000	1,200	55,100	1.58	72.5
Lumber in miter-sills and gates.....ft. B. M.	4,500	4,695	4,695	104.33	104.33
Lumber in needles.....ft. B. M.	7,000	0	0	0	0
Round timber.....lin. ft.	5,300	0	2,598	0	49.02
Second-class concrete.....cu. yds.	59,270	5,296	50,576	8.93	85.33
Reinforced concrete.....cu. yds.	387	1	283	.26	73.13
First-class masonry coping.....cu. yds.	3	0	2.31	0	77
Dry retaining wall.....cu. yds.	6,120	1,307	4,257	21.35	69.56
Third-class stone paving.....sq. yds.	168	0	115	0	68.45
Cobblestone paving.....sq. yds.	180	109	109	60.06	60.06
First-class riprap.....cu. yds.	230	62	62	26.96	26.96
Fourth-class riprap.....cu. yds.	12,400	2,569	4,388	20.72	35.39
Structural steel.....lbs.	159,485	11,950	142,818	7.49	89.55
Metal reinforcement.....lbs.	100,940	24,113	102,630	23.89	101.68
Iron castings, plain.....lbs.	26,800	1,236	22,863	4.61	85.31
Iron castings, machined.....lbs.	13,000	0	12,648	0	97.29
Metal in upper lock-gates.....lbs.	138,000	128,683	137,442	93.25	99.59
Metal in lower lock-gates.....lbs.	430,000	416,260	423,111	96.80	98.4
Metal in buffer-beams.....lbs.	80,000	65,566	70,893	81.96	88.62
Metal in lock-valves.....lbs.	60,000	50,006	56,168	83.34	93.61
Metal in guard-gates.....lbs.	680,000	616,519	616,795	90.66	90.71
Wooden fence.....lin. ft.	1,500	301	851	20.06	56.73
Wrought iron pipe railing.....lin. ft.	1,080	467	467	43.24	43.24
Lattice railing.....lin. ft.	184	0	181	0	98.37
Filling seams.....lin. ft.	2,500	0	0	0	0
Repointing old masonry.....lin. ft.	3,000	0	1,395	0	46.5
Storehouses.....No.	2	2	2	100	100
Coffer-dams, pumping, etc.....lump sum	$12,000	$6,600	$6,600	55	55
Drilling bolt holes in rock.....lin. ft.	600	0	0	0	0
Raising bridge superstructures.....lump sum	$1,800	0	$1,800	0	100
Maintaining highway traffic.....lump sum	$1,000	$250	$500	25	50
Maintaining navigation.....lump sum	$1,000	$500	$500	50	50
Deduct for buildings removed.....lump sum	$3,500	0	$3,500	0	100
Deduct for bridge superstructures removed, lump sum	$50	0	$50	0	100
Extra Work.					
Bracing timber tow-path.....lump sum		0	$450	0	100
Drilling and furnishing material for electric wire ducts.....lump sum		$846	$846	100	100
Removal of building.....lump sum		$175	$175	100	100



BARGE CANAL, CONTRACT No. 29.

View from the upper end of lock No. 19, soon after the construction of side walls had begun. In the foreground are seen the mixer and its concrete delivery train beneath.



Contract No. 30.

This contract extends westward from contract No. 31, and includes 3.1 miles of river line to Jacksonburg, 4.2 miles of land line to Herkimer, 4.4 miles of river line to Frankfort and 3 miles of land line to a point one-half mile east of Sterling creek. The contract includes lock No. 18 at Jacksonburg, a guard-gate and a movable dam at Herkimer, a retaining dam at Frankfort, five bridges, retaining walls and incidental work. The contract was let on July 16, 1909, to the Acme Engineering & Contracting Co., now of Herkimer, N. Y. Work was begun in October, 1909.

River prism, Little Falls to Jacksonburg:—About 700 feet of the river at the extreme eastern end of the contract has been coffer-dammed and rock excavation in the dry is in progress. A combination dipper and suction dredge has dredged the earth for the first mile and a half from the eastern end of the contract.

Lock No. 18, Jacksonburg:—The south wall and power-house have been completed and the north wall is nearly completed. Concreting should be finished this season. Steel for the gates and buffer-beams has been delivered.

Land line, Jacksonburg to Herkimer:—Prism excavation between Jacksonburg and Fort Herkimer has progressed. At Fort Herkimer the bulk of the heavy dry retaining wall has been built. At the dry wall near Washington street, Herkimer, excavation has progressed very slowly. About one hundred feet of wall at the easterly end has been built.

River prism, Herkimer to Frankfort:—The only work on this section has been the building of dikes on land line from Frankfort to west end of contract. The 20-in. hydraulic dredge has completed the prism, except trimming up slopes and bottom. The river cut-off at Sta. 5090 has been built. The maximum output of the dredge during any one month was 245,100 cu. yds.—in July, 1911. This dredge has also excavated on contract No. 29, east of the N. Y. C. & H. R. railroad.

The percentage of work completed to September 30, 1911, is 36.6. At the present rate the work will overrun the contract time by at least a year.

A large amount of field work has been done on appropriation surveys and running final location lines. The right-of-way line throughout the contract has been monumented.

Mr. Geo. I. Oakley, Assistant Engineer, has been in charge of this contract with an office at Herkimer and a suboffice at Jacksonburg.

The following summary shows the amount of work put under contract and the amount done to September 30, 1911, including alterations in force:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$1,000	$180	$580	18	58
Grubbing.....cu. yds.	29,700	9,753	13,604	32.84	45.8
Excavation.....cu. yds.	5,051,290	1,672,130	2,127,970	33.1	42.1
Sheeting and bracing.....ft. B. M.	100,000	0	0	0	0
Round timber bracing.....lin. ft.	1,000	0	0	0	0
Forming embankment.....cu. yds.	493,990	84,577	121,414	17.12	24.5
Lining.....cu. yds.	5,800	734	734	12.66	12.66
Puddle.....cu. yds.	300	0	0	0	0
Sawed lumber.....ft. B. M.	55,500	8,468	8,468	15.26	15.26
Sawed lumber in lock-needles.....ft. B. M.	19,000	0	0	0	0
Sawed lumber in miter-sills and gates.ft. B. M.	9,000	0	0	0	0
Foundation piles.....lin. ft.	28,600	0	0	0	0
Wooden sheet-piling.....ft. B. M.	166,000	0	0	0	0
First-quality steel piling.....sq. ft.	8,600	3,600	3,600	41.86	41.86
Second-quality steel piling.....sq. ft.	110,000	0	0	0	0
Second-class concrete.....cu. yds.	34,100	12,885	20,460	37.79	60
Third-class concrete.....cu. yds.	130	0	0	0	0
Second-class reinforced concrete.....cu. yds.	890	460	468	51.69	52.59
First-class masonry coping.....cu. yds.	7	0	0	0	0
Dry retaining wall.....cu. yds.	18,400	3,212	3,212	17.46	17.46
Wash wall.....cu. yds.	46,450	362	362	0.78	0.78
First-class stone paving.....sq. yds.	3,800	0	0	0	0
Second-class stone paving.....sq. yds.	340	0	0	0	0
Third-class stone paving.....sq. yds.	900	0	0	0	0
Cobblestone paving.....sq. yds.	170	0	0	0	0
First-class riprap.....cu. yds.	2,300	0	0	0	0
Second-class riprap.....cu. yds.	2,660	0	0	0	0
Third-class riprap.....cu. yds.	1,780	0	0	0	0
Fourth-class riprap.....cu. yds.	31,000	0	0	0	0
Structural steel.....lbs.	894,750	11,480	13,220	1.27	1.48
Metal reinforcement.....lbs.	96,150	27,836	31,579	28.95	32.84
Iron castings, plain.....lbs.	20,000	0	315	0	1.57
Iron castings, machined.....lbs.	9,850	4,116	6,174	41.78	62.68
Metal in lock-gates.....lbs.	260,000	591	756	0.23	0.2
Metal in buffer-beams.....lbs.	90,000	3,938	4,025	4.38	4.47
Metal in lock-valves.....lbs.	35,000	0	0	0	0
Metal in guard-gates.....lbs.	360,000	0	0	0	0
Wooden block pavement.....sq. yds.	300	0	0	0	0
Wooden pavement, 2½" thick.....sq. yds.	280	0	0	0	0
Wooden pavement, 3½" thick.....sq. yds.	900	0	0	0	0
Wooden fence.....lin. ft.	3,500	240	240	6.86	6.86
Lattice railing.....lin. ft.	980	0	0	0	0
Storehouses.....No.	2	0.05	0.05	2.5	2.5
Office building.....No.	3	0	1	33⅓	33⅓
Crab.....No.	1	0	0	0	0
Repointing old masonry.....lin. ft.	18,900	0	0	0	0
Maintaining highway traffic.....lump sum	$5,000	$1,700	$1,950	34	39
Maintaining navigation.....lump sum	$500	0	0	0	0
Coffer-dams, pumping, etc.....lump sum	$17,000	$2,720	$4,250	16	25
Raising bridge superstructures.....lump sum	$1,000	0	0	0	0
Deduct for value of bridge superstructures removed.....lump sum	$500	0	0	0	0
Deduct for value of buildings removed.lump sum	$700	$420	$560	60	80



BARGE CANAL, CONTRACT NO. 29.

View of lock No. 19 during the early part of concreting operations. The mixing plant is seen at the head of the lock between the side walls.

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ERIE CANAL, RESIDENCY No. 4-A.

Resident Engineer Earle Talbot reports:

This residency, with office at 196 Genesee street, Utica, has supervision over two Erie canal contracts, one of which is in the Eastern Division and the other in the Middle Division. The extent of the residency is from Sta. 5130, near Sterling creek, to Sta. 5775, which is just east of the Oriskany road, a distance of 12.96 miles.

Contract No. 29, Eastern Division, Maryland Dredging and Contracting Company, contractors, extends from near Sterling creek to the Oneida-Herkimer county line, a distance of four miles.

Contract No. 42, Middle Division, Shanley-Morrissey, Incorporated, contractors, extends from the Oneida-Herkimer county line to Oriskany road, a distance of 8.96 miles.

Contract No. 29.

Mr. Maurice Williams is Assistant Engineer in charge of this contract, with office at Frankfort. Work was begun in June, 1909, by the Maryland Dredging and Contracting Company; the contract time for completion is December 31, 1911.

Due to the fact that the construction cost of this contract will underrun the estimates about 10 per cent, the actual relative value of the work performed to date is 55 per cent, whereas the apparent relative value is 49.5 per cent.

The prism excavation west of lock No. 19 is, in general, completed; isolated dikes and trimming remain to be done.

Excavation for lock No. 19 is complete.

The prism excavation east of lock No. 19 is being done by a suction dredge, operated by the Acme Engineering Company on a subcontract. The temporary detour of the N. Y. C. & H. R. railroad main line across the canal just east of lock No. 19 interposes a dike which could not be excavated this season.

Expensive trimming of embankment slopes has been done.

Harbor and Schuyler highway bridges are open to traffic.

The dive culvert at Sta. 5214 is 75 per cent completed, work having been intermittent.

Under an extra work order and alterations, 214,000 ft. B. M. of sheet-piling have been driven to reinforce embankments in three somewhat swampy localities.

The work on this contract was suspended during December, January and February, owing to the weather conditions, and for the remainder of the season all effort has been concentrated upon lock No. 19. This has resulted in the completion of the lock walls, with the exception of the upper gate and breast wall sections; also the completion of the lower guide walls and all *but* three of the upper guide wall sections. These, with the invert, or floor, will be finished this year. In addition to this, under a separate contract with the N. Y. C. & H. R. R. R. Co., the contractors have excavated for and completed the abutments and wing walls of the railroad bridge, which will be a six-track skew, crossing at the present grade. This work forms a continuation of the lower guide walls of lock No. 19 and involves over 12,000 cubic yards of concrete.

The attached table shows the amount of work under contract items done this year and the total amount of work done to date:

ITEMS OF WORK.	Preliminary estimate as affected by alterations Nos. 1, 2, 3, 4, 5 and 6.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$500	0	95%	0	95.0
Grubbing.....cu. yds.	61,670	3,687	40,332	6.0	65.4
Excavation.....cu. yds.	1,176,800	128,221	661,698	10.9	56.3
Sheeting and bracing.....ft. B. M.	160,000	28,000	81,000	17.5	50.6
Round timber.....lin. ft.	1,000	401	401	40.1	40.1
Forming embankment.....cu. yds.	331,400	46,701	229,126	14.1	69.3
Lining.....cu. yds.	2,088	571	1,081	27.4	51.7
Sawed lumber.....ft. B. M.	26,800	9,000	18,400	33.6	68.6
Foundation piles, 12 to 30 ft. long.....lin. ft.	13,580	48	7,553	0.4	55.8
Wooden sheet-piling.....ft. B. M.	650,000	214,000	230,000	32.9	35.4
Second-class concrete.....cu. yds.	33,822	17,043	18,010	50.4	53.5
Second-class reinforced concrete.....cu. yds.	299	0	85	0	28.4
Fourth-class riprap.....cu. yds.	6,020	13	13	0.2	0.2
30-inch vitrified pipe, laid.....lin. ft.	41	0	36	0	87.8
Structural steel.....lbs.	338,700	70,415	270,763	20.8	80.1
Metal reinforcement.....lbs.	120,900	30,484	40,243	25.2	33.3
Iron castings, machined.....lbs.	9,500	8,264	8,264	87.0	87.0
Wooden pavement.....sq. yds.	880	737	737	83.9	83.9
Wooden fence.....lin. ft.	2,340	695	2,074	29.7	88.5
Maintaining highway traffic.....lump sum	$1,000	0	80%	0	80.0
Office building.....lump sum	$250	0	$250	0	100.0
Coffer-dams, pumping, etc.....lump sum	$7,500	44.5%	44.5%	44.5	44.5

Apparent percentage of work done during year = 24.7 per cent.
Actual percentage of work done during year = 27.5 per cent.
Apparent percentage of total work done to date = 49.5 per cent.
Actua percentage of total work done to date = 55.0 per cent.



BARGE CANAL, CONTRACT No. 29.

View showing construction of culvert for Burch creek. This is a reinforced concrete, dive culvert, under what will be the channel of the canal.

NOT

CHAMPLAIN CANAL, RESIDENCY NO. 1.

Resident Engineer F. P. Williams reports:

This residency extends from the connection with contract No. 1, north of the guard-lock at Northumberland, to the junction with the Erie canal at Waterford, a length of about 27 miles.

Appropriation Surveys. Surveys have been made for 21 parcels of land to be appropriated on contract No. 73 and maps completed for the same. The necessary searches were made in the offices of the County Clerks for the above mentioned maps.

Gage Readings. Daily readings of 7 gages between locks Nos. 1 and 2 and one gage above lock No. 2 were continued and plotted on profile; also eight gages in the vicinity of Stillwater dam. These readings are taken for the purpose of meeting questions arising from Barge canal construction.

The office work has consisted of the regular routine duties, such as checking estimates, etc., augmented by making miscellaneous computations, drawings, tracings, reports, etc.

Below is given a concise description of the several contracts in this residency:

Contract No. 68 provides for constructing, in the Hudson river, lock No. 3 at Mechanicville, lock No. 4 at Stillwater and lock No. 5 at Northumberland, together with accompanying land lines. Length, about 1.4 miles. Contract price, with alterations, $1,042,735.60.

Contract No. 69 provides for constructing, in the Hudson river, lock No. 2 below Mechanicville. Length, 0.17 mile. Contract price, $240,061.

Contract No. 70 is for dredging a channel in the Hudson river and performing incidental work between Waterford and lock No. 1. Length, 3.32 miles. Contract price, $779,636.50.

Contract No. 71 provides for constructing, in the Hudson river, lock and dam No. 1 above Waterford and dredging a prism between lock No. 1 and lock No. 2. Length, 3.96 miles. Contract price, $1,561,119.

Contract No. 72 is for dredging a channel in the Hudson river from lock No. 2 to lock No. 4. Length, 4.1 miles. Contract price, including alteration, $1,202,658.

Contract No. 73 provides for dredging a channel in the Hudson river and performing work incidental thereto from Stillwater to Northumberland. Length, 15.0 miles. Contract price, $767,467.

More detailed descriptions of the different contracts are as follows:

Contract No. 68.

This contract was let to Shanley–Morrissey, Inc., November 23, 1908, and work began thereon immediately. During the year ended September 30, 1911, the following work has been done:

Lock No. 3. The work at the close of last year's report was continued and the lock, including the lower gates, etc., below the Paper Co.'s dam, was completed last season. During the season of 1911 to the date of this report, the upper end of the lock has been completed, except lift wall and erection of gates. The work has been done inside of coffer-dam in upper pool. A coffer-dam for constructing upper guide wall is nearing completion. A complete concrete plant, three large derricks, pile driver scow, dinkeys, cars, pumps, etc., comprise contractor's plant.

Mr. A. C. Richards, Assistant Engineer, has been in charge of this work with a party averaging about five men.

Lock No. 4. The work at this site at the close of last year's report was continued through the fall and winter of 1910–11 and the lock and the adjacent prism completed during the early part of the summer. The construction plant noted in last year's report has been removed from site and shipped to other contracts.

Mr. R. D. Hayes, Assistant Engineer, has been in charge of this lock with a party of about five men.

Lock No. 5. The work at this site at the close of last year's report was continued through the fall and winter of 1910–11 and the lock, including the steel, gates, etc., was completed in the early part of 1911. During the summer of 1911 the cleaning up of the prism adjacent to lock has been in progress with a traveling derrick with a draw bucket, material being hauled away with dinkeys and cars. This work also includes the widening of prism provided for by alteration No. 3, making the channel 94 instead of 75 ft. in width. This latter work is in progress at the time of



BARGE CANAL, CONTRACT No. 68.

View of lock No. 3, Champlain canal, at Mechanicville, showing a dam across the Hudson river, which was subsequently cut through to make a place for the upper end of the lock.

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this report, but will be completed this fall. All the plant except that used for excavating has been removed from the site.

Mr. L. T. Howard, Assistant Engineer, has been in charge of this lock.

The following table shows the amount of work done during the year and to date, with percentages:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations Nos. 1, 2 and 3.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		0	100%	0	Finished
Grubbing.....cu. yds.	4,800	113	3,241	2.4	Finished
Excavation.....cu. yds.	554,624	60,222	543,382	10.9	98.0
Sheeting and bracing.....ft. B. M.	60,000	8,664	58,204	14.4	Finished
Round timber bracing.....lin. ft.	4,000	338	2,984	8.5	Finished
Channeling.....sq. ft.	170,000	0	*	0	0
Embankment, wet.....cu. yds.	30,000	2,321	9,734	7.7	32.4
Embankment, dry.....cu. yds.	42,474	9,316	46,617	2.2	109.7
Lining.....cu. yds.	510	463	463	90.7	Finished
Sawed lumber, yellow pine or Douglas fir ft. B. M.	5,600	5,140	5,140	91.8	91.8
Sawed lumber in needles.....ft. B. M.	14,000	13,049	13,049	93.2	Finished
White oak lumber in miter-sills and gates ft. B. M.	25,000	19,687	19,687	78.7	78.7
Foundation piles.....lin. ft.	3,000	0	*	0	0
Second-class concrete.....cu. yds.	68,120	17,633	59,524	25.9	87.4
Reinforced concrete.....cu. yds.	1,460	715	1,313	49.0	Finished
First-class masonry coping.....cu. yds.	5	2	2	40.0	40.0
Wash wall.....cu. yds.	5,362	4,202	5,296	78.3	98.7
Third-class stone paving.....sq. yds.	72	52	52	72.1	Finished
Fourth-class riprap.....cu. yds.	200	0	0	0	0
Structural steel.....lbs.	180,000	154,343	163,278	85.7	90.7
Metal reinforcement.....lbs.	58,738	29,387	66,980	50.3	114.3
Iron castings, plain.....lbs.	28,000	17,010	22,047	60.7	78.7
Iron castings, machined.....lbs.	26,000	9,822	24,642	37.7	94.8
Metal in lock-gates.....lbs.	770,000	638,977	644,135	82.9	83.6
Metal in buffer-beams.....lbs.	240,000	179,592	191,774	74.8	79.9
Metal in lock-valves.....lbs.	100,000	76,131	80,916	76.1	80.9
Wooden pavement.....sq. yds.	360	360	360	100.0	Finished
Wooden fence.....lin. ft.	1,200	960	960	80.0	Finished
Drilling bolt holes in rock.....lin. ft.	1,372	32	484	2.3	35.3
Raising bridge superstructures.....lump sum		0	*	0	0
Maintaining highway traffic.....lump sum		15%	90%	15.0	90.0
Storehouses.....No.	3	3	3	100.0	Finished
Office buildings.....No.	2	0	2	0	Finished
Coffer-dams, pumping, etc.....lump sum		32.31%	86.28%	32.3	86.3
Taking up and relaying wash wall.....cu. yds.	1,400	0	0	0	0

* None required.

Contract No. 69.

This contract was let to I. A. Hodge & Co., Inc., December 11, 1909. The concrete work in the lock in progress at the close of last year's report was continued until about December 1 and excavation was continued until January, 1911, when the work was flooded.

During the season of 1911 steady progress has been made in the concrete work and the contractors are planning to complete all

the concrete except the power house and the upper guide wall before shutting down the first of the year.

The work completed up to September 30, 1911, includes the completion of concrete in lock, except a portion of the upper and lower miter walls and a few blocks in upper end of west wall. Also the lower part of the upper guide wall and the upper retaining wall on east side.

The work of putting in bridge piers is under way.

Mr. F. S. Crowell, Assistant Engineer, has been in charge of this contract.

The following table shows the amount of work done during the year and to date, with percentages:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		0	100%	0	Finished
Excavation.....cu. yds.	78,000	7,024	58,517	9.0	75.0
Sheeting and bracing.....ft. B. M.	5,000	0	3,140	0	62.8
Round timber bracing.....lin. ft.	500	0	423	0	84.6
Forming embankment.....cu. yds.	100	0	0	0	0
Sawed lumber, yellow pine or Douglas fir ft. B. M.	6,000	0	0	0	0
White oak lumber in miter-sills and lock-gates ft. B. M.	9,000	0	0	0	0
Second-class concrete.....cu. yds.	19,400	13,077	15,887	67.4	81.8
Second-class reinforced concrete.....cu. yds.	261	30	30	11.4	11.4
First-class masonry coping.....cu. yds.	2				
Third-class stone paving.....sq. yds.	200				
Third-class riprap.....cu. yds.	100				
Fourth-class riprap.....cu. yds.	100				
Structural steel.....lbs.	181,400	1,660	1,660	0.9	0.9
Metal reinforcement.....lbs.	26,000	7,229	8,603	27.8	33.1
Iron castings, plain.....lbs.	7,600	240	240	3.2	3.2
Iron castings, machined.....lbs.	8,600	4,120	4,120	47.9	47.9
Metal in lock-gates.....lbs.	260,000	703	703	0.2	0.2
Metal in buffer-beams.....lbs.	77,000	5,337	5,337	6.9	6.9
Metal in lock-valves.....lbs.	34,000	2,347	2,347	6.9	6.9
Wooden pavement.....sq. yds.	440				
Wooden fence.....lin. ft.	340				
Drilling bolt holes in rock.....lin. ft.	*310	290	426	59.2	86.7
Coffer-dams, pumping, bailing and draining lump sum		25%	45%	25.0	45.0
Office building.....lump sum		0	100%	0	Finished
Storehouse.....lump sum		0	0	0	0

* Increased to 490 lin. ft., by the Canal Board, June 8, 1911.

Contract No. 70.

This contract was let January 11, 1910, to Shanley-Morrissey, Inc., of New York.

The only portion of the contract where work has been in progress is a section of 3,700 feet at the north end. This portion

of the route traverses a back channel of the river, the average cutting being about 18 feet.

The excavation work at the close of last year's report was continued by three tower scraper excavators until the high water of January 3, 1911. The tower work was then discontinued, wagon drills being removed and pumps stored. Some rock was drilled and blasted during the fall.

During the working season of 1911 a coffer-dam was constructed at about Sta. 1253 and the prism between this point and the north end of the contract, about 500 feet, was excavated by steam-shovel, dinkeys, and cars. This work was done by the Merion Construction Co., subcontractors, who have also the subcontract for the adjacent lock and dam on contract No. 71. Preparations have been made to start tower scrapers at work the first of October, 1911.

Mr. F. C. Koerner, Assistant Engineer, has been in charge of this contract.

The following table shows the amount of work done during the year and to date, with percentages:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		0	65%	0	65.0
Excavation.....cu. yds.	757,600	81,116	217,654	10.7	28.7
Sheeting and bracing.....ft. B. M.	2,000	0	0	0	0
Forming embankment.....cu. yds.	300	0	0	0	0
Lining.....cu. yds.	210	0	0	0	0
Second-class concrete.....cu. yds.	140	0	0	0	0
Wash wall.....cu. yds.	10,490	0	0	0	0
First-class riprap.....cu. yds.	200	0	0	0	0
Second-class riprap.....cu. yds.	200	0	0	0	0
Third-class riprap.....cu. yds.	200	0	0	0	0
Fourth-class riprap.....cu. yds.	400	0	0	0	0
Iron castings, plain.....lbs.	6,500	0	0	0	0

Contract No. 71.

This contract was let to Shanley-Morrissey, Inc., January 11, 1910.

The work in progress at Wright's rifts, Sta. 1110 to Sta. 1137, was continued during the fall of 1910, up to January 3, when the high water in the river flooded the coffer-dam and plant. The excavation inside of coffer-dam was nearing completion. Later

the coffer-dam was repaired and plant removed and work shut down for the winter.

The work on coffer-dam below lock No. 2 was continued throughout the fall of 1910 and to January 3, 1911, when high water in river flooded the work. The excavation had been practically finished. Later the coffer-dam was repaired and about a month afterwards the steam-shovel and plant were removed and laid up for the winter.

During 1911 the work opened up at Wright's in 1910 was extended both ways by constructing a coffer-dam downstream about 1,500 feet and by constructing a coffer-dam upstream by first enclosing 1,600 feet from Sta. 1110 to Sta. 1094 and later an additional coffer-dam 1,200 feet upstream to Sta. 1082. Most of the rock in the coffer-dam for the 1,500 feet below the 1910 work was drilled and some blasted, but none removed during the season.

The first coffer-dam built above the 1910 work was closed and unwatered after considerable difficulty during the last of July, 1911. One 10-inch pump, running continuously, unwatered the work satisfactorily. The material in this section, comprising 70,000 cu. yds., mostly gravel, was removed by two steam-shovels, working two shifts from July 25 to the last of September, 1911. The coffer-dam upstream is rapidly nearing completion and the work of excavating the prism inside of it is about to begin and will be done by the same steam-shovels used in the first section, the material being 62,000 cu. yds. of rock and gravel.

The subcontractor's 1911 work below lock No. 2 consists of extending coffer-dam 500 feet downstream from the 1910 coffer-dam to Sta. 1050. On account of most of the 1910 coffer-dam being in place, it was repaired and one coffer-dam made for the entire stretch, thus affording more room for plant layout for the 1911 work. Three pumps, one 12-inch, one 10-inch and one 8-inch, unwatered the work. The same steam-shovel plant used the year previous is being used in removing the material, which amounts to 33,000 cu. yds.— the removal of material having just commenced at the time of this report.

The work at lock No. 1, sublet to the Merion Construction Co., was opened up in the spring of 1911 and the excavation for the lock and approach wall largely completed during the summer. Concreting has been in progress and the construction of the west lock wall is nearing completion. At this site an extensive concrete plant has been constructed. The other principal items of plant are compressor plant, carpenter shop, steam-shovel, three derricks, one McMyler locomotive crane, dinkeys, cars, drills, etc.

Mr. R. D. Hayes, Assistant Engineer, has been in charge of this contract.

The following table shows the condition of this contract at the close of the fiscal year:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		0	50%	0	50.0
Excavation.....cu. yds.	680,000	243,697	312,603	35.8	46.0
Sheeting and bracing.....ft. B. M.	20,000	0	0	0	0
Round timber bracing.....lin. ft.	500	0	0	0	0
Channeling.....sq. ft.	22,000	0	0	0	0
Forming embankment.....cu. yds.	320	0	0	0	0
Lining.....cu. yds.	100	0	0	0	0
Sawed lumber, yellow pine or Douglas fir ft. B. M.	1,500	0	0	0	0
White oak lumber in miter-sills and lock-gates ft. B. M.	8,000	0	0	0	0
Second-class concrete.....cu. yds.	27,300	5,982	5,982	21.9	21.9
Second-class reinforced concrete.....cu. yds.	320	0	0	0	0
Wash wall.....cu. yds.	420	0	0	0	0
Third-class stone paving.....sq. yds.	490	0	0	0	0
First-class riprap.....cu. yds.	300	0	0	0	0
Second-class riprap.....cu. yds.	1,480	0	0	0	0
Third-class riprap.....cu. yds.	300	0	0	0	0
Fourth-class riprap.....cu. yds.	880	0	0	0	0
Structural steel.....lbs.	18,500	2,989	2,989	16.2	16.2
Metal reinforcement.....lbs.	41,500	1,332	1,332	3.2	3.2
Iron castings, plain.....lbs.	13,700	0	0	0	0
Iron castings, machined.....lbs.	8,600	2,058	2,058	23.9	23.9
Metal in lock-gates.....lbs.	236,000	0	0	0	0
Metal in buffer-beams.....lbs.	78,000	395	395	0.5	0.5
Metal in lock-valves.....lbs.	33,000	83	83	0.3	0.3
Drilling bolt holes in rock.....lin. ft.	1,100	0	0	0	0
Coffer-dams, pumping, bailing and draining lump sum		25.3%	25.3%	25.3	25.3
Office building.....lump sum		0	100 %	0	100.0
Storehouse.....lump sum		0	0	0	0

Contract No. 72.

The work at First island (Mechanicville), which had just commenced at the close of last year's report was continued a short time by steam-shovel and cars and later by dipper dredge and cars,

the work closing down the first part of December. Only a portion of the cut at this point was removed.

The work in the coffer-dam below Stillwater in the vicinity of Sta. 820, in progress at the close of last year's report, was continued until the last of November, when plant was removed to winter quarters. The work in this cut was completed.

The 12-inch hydraulic dredge was operated between lock No. 3 and the B. & M. R. R. bridge during October and November, closing down the first part of December for the winter. Only part of the excavation was completed.

In the coffer-dam below lock No. 3 the prism excavation was in progress with steam-shovel, dinkeys and cars during October and continued until the middle of March, completing work inside of coffer-dam at this point.

In 1911 the work at the north end of the contract was simply an extension of the 1910 work. It was done in two sections, one coffer-dam extending from end of 1910 work, Sta. 829, downstream to Sta. 841. This work was unwatered by one 10-inch pump, a reserve of one 8-inch pump being at hand, and 74,000 cu. yds. of shale removed by one steam-shovel, working one and two shifts, during months of June to September, inclusive. The second coffer-dam adjoins this and extends downstream to Sta. 855, about 1,400 feet, the material amounting to 60,000 cu. yds. and being shale rock. The work of unwatering this section is in progress at the time of this report.

The hydraulic dredge has been operated between lock No. 3 and Sta. 855 in prism excavation and used at intervals for filling coffer-dams.

At First island (Mechanicville) the work inside of coffer-dam commenced during 1910 was renewed in the spring by the dipper dredge and standard gage locomotives and 12-yd. cars. Practically all the earth excavation was removed. The drill boat was used in drilling the rock at this point.

At Hart's. At the island above lock No. 2 at the Hudson River Power Transmission Co.'s plant, the prism between Sta. 996 and Sta. 1017 was coffered off by constructing a coffer-dam from the

upper end of the island to the west shore and from the lower end of the island to the west shore. The rock bed of the river was unwatered with one 18-inch pump, working part time. There are 125,000 cu. yds. to be excavated. The excavation was commenced during September, by using the same plant that was used at First island, opposite Mechanicville, material being spoiled on Quack island. Six mounted drills are used in drilling the rock.

Mr. H. W. Hale, Assistant Engineer, has been in charge of this contract.

The following table shows the amount of work already done:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		30%	90%	30.0	90.0
Excavation.....cu. yds.	955,000	308,179	410,712	32.2	43.0
Sheeting and bracing.....ft. B. M.	2,000	0	0	0	0
Round timber bracing.....lin. ft.	400	0	0	0	0
Stone filling in cribs.....cu. yds.	2,400	0	0	0	0
Rock spoil filling.....cu. yds.	1,000	0	0	0	0
Structural steel.....lbs.	9,000	0	0	0	0
Iron castings, plain.....lbs.	5,800	0	0	0	0
Sawed lumber, yellow pine or Douglas fir ft. B. M.	180,000	0	0	0	0

Contract No. 73.

The removal of the million cu. yds. of gravel, sand, clay and silt on this contract was commenced late in the season of 1910 at Schuylerville by a 20-inch hydraulic dredge, a dipper-dredge being used to some extent in building dikes. The work closed down the first part of December.

Work was renewed in March, 1911, and was continued steadily throughout the season, and most all the excavation between the Schuylerville bridge and Stillwater has been excavated.

The east retaining wall at Northumberland, which was in progress at the close of last year's report, was continued during the fall and renewed in the spring of this year, being completed during the early summer. A small cut-off wall at the culvert and a retaining wall at the G. & J. R. R. bridge were constructed during the season.

Mr. L. T. Howard, Assistant Engineer, has been in charge of this contract.

The following table shows the present conditions of this contract:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		17%	25%	17	25
Excavation.....cu. yds.	1,314,000	760,319	770,694	57.9	58.6
Sheeting and bracing.....ft. B. M.	17,000	8,618	8,618	50.7	50.7
Round timber bracing.....lin. ft.	5,000	68	68	1.4	1.4
Forming embankment.....cu. yds.	21,500	5,379	9,168	25.0	42.6
Lining.....cu. yds.	1,200	0	0	0	0
Sawed lumber, yellow pine or Douglas fir ft. B. M.	2,000	0	0	0	0
Wooden sheet-piling.....ft. B. M.	2,000	0	0	0	0
Second-class concrete.....cu. yds.	6,500	1,991	1,991	30.6	30.6
Second-class reinforced concrete.....cu. yds.	29	0	0	0	0
Wash wall.....cu. yds.	5,800	0	0	0	0
Second-class stone paving.....sq. yds.	160	0	0	0	0
First-class riprap.....cu. yds.	200	0	0	0	0
Second-class riprap.....cu. yds.	200	0	0	0	0
Third-class riprap.....cu. yds.	300	0	0	0	0
Fourth-class riprap.....cu. yds.	1,500	0	0	0	0
Structural steel.....lbs.	19,000	1,463	1,463	7.7	7.7
Metal reinforcement.....lbs.	6,200	862	862	13.9	13.9
Iron castings, plain.....lbs.	10,800	0	0	0	0
Wooden pavement.....sq. yds.	165	0	0	0	0
Wooden fence.....lin. ft.	2,400	0	0	0	0
Drilling bolt holes in rock.....lin. ft.	670	248	248	37.0	37.0
Moving bridge at lock No. 5.....lump sum		0	0	0	0
Moving bridge superstructures.....lump sum		0	0	0	0
Maintaining highway traffic.....lump sum		0	0	0	0
Maintaining navigation.....lump sum		0	0	0	0
Coffer-dams, pumping, bailing and draining, lump sum		0	0	0	0

CHAMPLAIN CANAL, RESIDENCY NO. 2.

Resident Engineer E. V. R. Payne reports:

Contract No. 1.

This contract provides for excavating the river channel from Northumberland to Fort Miller and from Crocker's Reef to Fort Edward; the construction of Crocker's Reef dam and the approaches to the head and foot of the "land line" and other incidental work. Length, 7.075 miles. Alteration No. 6 eliminated excavation from Sta. 9 + 52 to Sta. 23 + 85, which is near the Northumberland change bridge across the Hudson river. Con-

tractor, Empire Engineering Corporation. Engineer in charge for the State, E. W. Wendell, Assistant Engineer.

This contract, with the alterations in force, extends from Northumberland change bridge to lock No. 6, at Fort Miller (called the south section), and from Crocker's Reef to south end of contract No. 26, about one mile south of Fort Edward (called the north section). The interval from Fort Miller to Crocker's is covered by contract No. 3.

No excavation by dredging has been done in the north section since November 1, 1908. There still remains to be excavated from this section about 51,000 cubic yards.

The Lobnitz rock-breaker was operated three shifts daily until December 8, 1910, at which time, due to ice in the river, work was suspended until April 10, 1911, when work was resumed, for two daily shifts, until June 12, 1911; then one shift per day until June 24, 1911, when this machine was taken out of commission on account of the remaining rock being at isolated points and of too small an amount for the rock-breaker to loosen efficiently.

Upon the hull of the floating pile driver three tripod steam drills were mounted. This was to be used as a drill boat to loosen the remaining rock points on the south section. It began working on April 25, 1911, one shift daily, and continued until September 14, 1911, when the channel was swept and found to be to line and grade.

The dipper dredge *Peconic* excavated one shift per day from October 1 to November 1, 1910, two daily shifts until November 15, and three shifts to December 8, 1910, when work was suspended for the winter. On April 17, 1911, the work of excavation was resumed, one shift per day, and continued, barring short delays for repairs, until September 19, 1911, when the south section of contract was completed, and the dredge was dismantled and shipped to Buffalo, together with the entire plant. The total amount of material excavated inside of the prism lines during the year was 4,814 cubic yards,— largely from scattered rock points, which was deposited in the spoil area along the island on east side of Fort Miller bay.

The following is a summary of the items on contract No. 1 as they stand on September 30, 1911, as modified by all alterations:

ITEMS OF WORK.	Preliminary estimate as affected by alterations Nos. 1, 2, 3, 5 and 6.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		0	45%	0	45.0
Grubbing.....cu. yds.	2,400	0	2,366	0	98.6
All excavation.....cu. yds.	868,450	4,814	703,303	0.5	80.9
Forming embankment.....cu. yds.	26,000	0	24,657	0	94.8
Yellow pine timber and plank.....ft. B. M.	85,000	0	85,724	0	100.9
Round timber in cribs.....lin. ft.	68,950	0	65,343	0	94.8
Mooring piles.....No.	10	0	9	0	90.0
Iron and steel fastenings.....lbs.	3,500	0	308	0	8.8
First-class concrete.....cu. yds.	1,000	0	828	0	82.8
Second-class concrete.....cu. yds.	4,065	0	3,448.6	0	84.8
Third-class concrete.....cu. yds.	300	0	331.3	0	110.4
Wash wall, including coping.....cu. yds.	7,750	0	5,906	0	76.2
Stone filling.....cu. yds.	7,757	0	7,442	0	95.9
First-class riprap.....cu. yds.	326	0	241	0	73.9

Contract No. 54.

This contract provides for constructing lock No. 7 at Fort Edward. Length, 0.22 mile. Contractor, Hunkin-Conkey Construction Company. Engineer in charge for the State, C. A. Curtis, Assistant Engineer.

At the beginning of the fiscal year 284 linear feet of the upper approach wall had been finished and partly backfilled at the north end of contract. During the current year the upper approach walls were both finished as far south as Sta. 1251 + 18; also two footing courses for thrust walls. All work has been done in short sections, enclosed in steel sheet-pile coffer-dams of 180 feet in length, the steel being pulled and redriven for each succeeding section.

Concrete work continued intermittently until November 1, 1910, when the coffer-dam was removed and steel redriven during the month across the lock site at Sta. 1251 + 40. As soon as completed the dam was unwatered and pile driving progressed in foundations of upper splay walls and buffer-beam sections until January 3, 1911, when the coffer-dam failed and this work was closed down. Placing embankment back of completed walls continued until March 13, 1911.

On March 16, 1911, the contract was assigned by the original contractors to Hunkin-Conkey Construction Company, of Cleveland, O.



BARGE CANAL, CONTRACT No. 54.

View showing construction of lock No. 7, Champlain canal, near Fort Edward; built at the edge of the Hudson river, where the canal leaves the river and begins its ascent over the low divide separating the Hudson river and Lake Champlain watersheds.

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Sufficient sheet-piles were delivered in April to completely enclose the entire lock with a single row of piles and the work of driving began on April 12, and after delays from high water, the dam was closed June 7. When the electrically-driven centrifugal pumps had lowered the water 4½ feet, a section of dam 65 feet in length gave way and the dam filled. A cross dam of sheet-piles was driven at Sta. 1252 + 50, above the breach in main dam, to allow construction work to proceed, while longer steel-piles were being secured to repair the main dam. In July this upper dam was unwatered, piles cut off and concreting the balance of the approach walls progressed as far as this dam allowed. The main dam was repaired and anchor cables fastened to Bradley's island and to pile clusters outside completed it, and pumps are being connected up at south end of lock to unwater it.

All concrete is placed north of Sta. 1251 + 18; also two footing courses for lock walls south of this point. Pile foundation is complete as far as Sta. 1252 + 18, and embankment back of upper west approach wall is nearly placed.

The following is a summary of the items on contract No. 54, as affected by Alteration No. 1, as they stand on September 30, 1911:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	45,600	13,738	14,647	30.1	32.1
Sheeting and bracing.....ft. B. M.	*14,000	9,135	9,335	65.2	66.6
Forming embankment.....cu. yds.	11,300	7,707	8,326	68.2	73.6
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	1,100	0	0	0	0
Sawed lumber in needles.....ft. B. M.	16,000	0	0	0	0
White oak lumber in miter-sills, lock-gates and buffer-blocks.....ft. B. M.	6,800	0	0	0	0
Foundation piles, 16 ft. to 30 ft. long....lin. ft.	60,600	16,901	21,548	27.8	35.5
Mooring piles, 20 ft. long.....lin. ft.	130	0	0	0	0
Wooden sheet-piling.....ft. B. M.	225,000	98,496	145,008	43.7	64.4
Second-class concrete.....cu. yds.	21,700	3,299	4,608	15.2	21.2
Wash wall.....cu. yds.	600	0	0	0	0
Second-class riprap.....cu. yds.	240	0	0	0	0
Third-class riprap.....cu. yds.	3,660	0	0	0	0
Structural steel.....lbs.	7,200	0	0	0	0
Metal reinforcement.....lbs.	376,000	2,628	2,628	0.01	0.01
Steel castings.....lbs.	9,800	0	0	0	0
Iron castings, machined.....lbs.	7,300	0	0	0	0
Wrought iron pipe, 3-inch diameter.....lin. ft.	250	0	0	0	0
Wrought iron pipe railing.....lin. ft.	480	0	0	0	0
Metal in lock-gates.....lbs.	200,000	0	0	0	0
Metal in buffer-beams.....lbs.	92,000	2,621	2,621	2.85	2.85
Metal in lock-valves.....lbs.	25,000	0	0	0	0
Coffer-dams, pumping, bailing and draining, lump sum	$18,000	40½%	40½%	40.17	40.17

*Amount of sheeting and bracing increased from 2,000 ft. B. M. to 14,000 ft. B. M. by resolution of the Can Board dated April 6, 1911.

Contract No. 27-A.

This contract provides for completing the construction of the canal, together with all incidental work, between Station 1046 + 16, the south end of contract No. 25, at Dunhams Basin road, and the Hudson river at Fort Edward, Station 1245. Length, 3.76 miles. Contractors, Holler & Shepard. Engineer in charge for the State, S. W. Belding, Assistant Engineer.

This contract was awarded to Holler & Shepard, of Rochester, N. Y., and was in force December 1, 1910.

Clearing. About 44 per cent of the total amount has been done at the extreme south end of the contract.

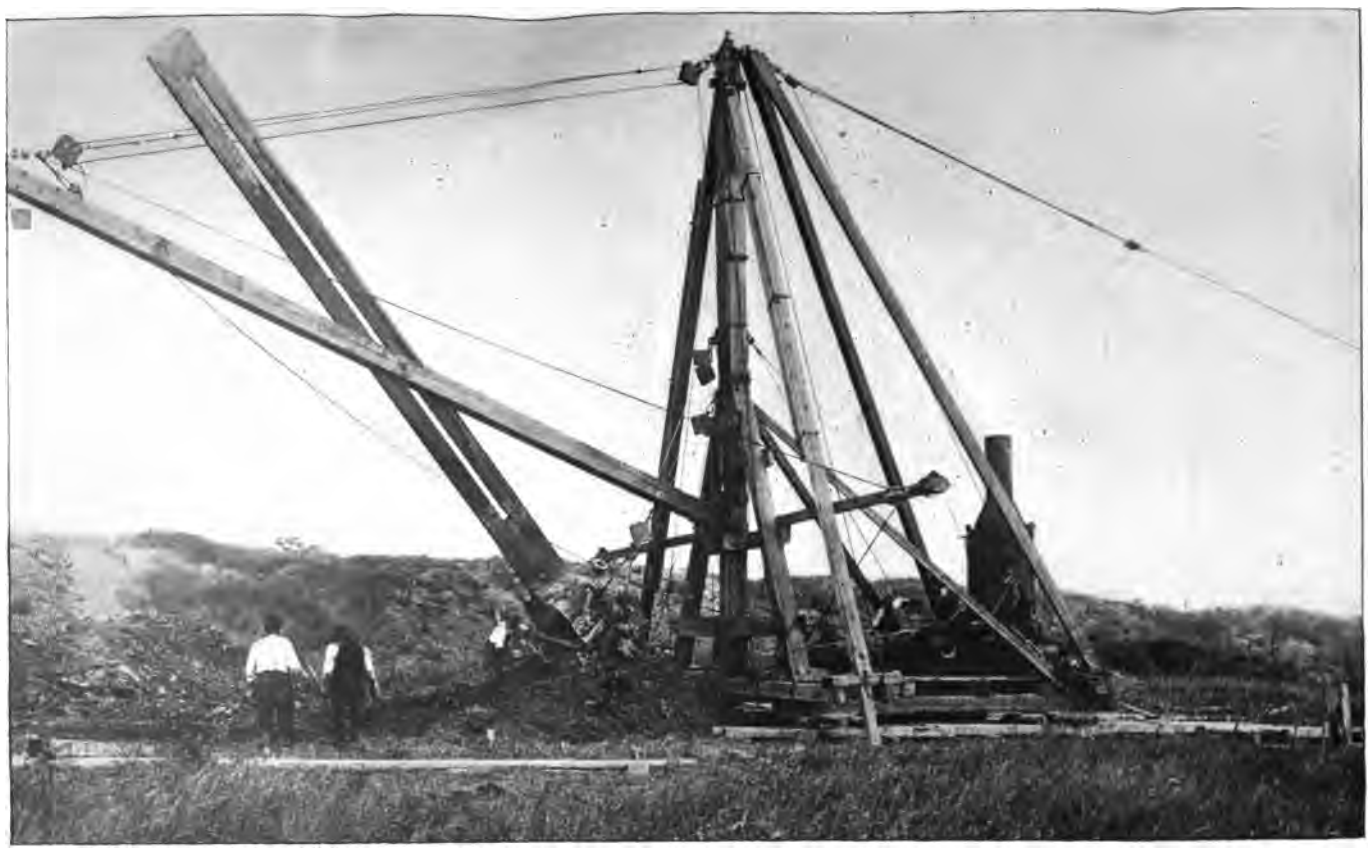
Grubbing. This work has been done on the area for canal embankment, west side, from north end to about Sta. 1123, between Stas. 1187 and 1197, and between Stas. 1239 and 1242 at the south end. The depth allowed varies from 6 inches at the north and south ends to about 3 inches at East street and near the upper pool at lock No. 8.

Excavation. The wash wall notch has been excavated on the east side nearly the entire distance between the north end and Sta. 1137; on the west side from Sta. 1046 + 16 to Sta. 1053 + 00, and between Stas. 1084 + 00 and 1096 + 00. The prism slopes have been trimmed over a greater part of the distance where wash wall notch was made.

Near the north splay walls at lock No. 8 the block of excavation has been removed and about one-third of the material at the south end of this lock. The rock ledge in the lower pool of lock No. 8 has not yet been excavated.

Excavation for the northwest and about one-half of that for both the southwest and southeast approach wall foundations, at lock No. 8, is completed. 4,000 cubic yards have been removed from the prism at the south end of the contract — Stas. 1239 to 1245.

Spoil bank excavation has not been completed at any point. Only sufficient material has been removed on the west side to make canal embankment between Stas. 1049 and 1056, and Stas. 1061 and 1081. About 40 per cent of the rock spoil east of lock No. 8 has been used for backfilling the east lock wall.



BARGE CANAL, CONTRACT NO. 27–A.

Excavator at work near the north end of the contract. The unique construction of the excavator is noteworthy.

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Power plant outlet ditch on west side of lock No. 8 has been completed from Bond creek to within 150 feet of the west lock wall. About 2,000 cubic yards of material have been removed from the ditches east of the canal, near the dive culvert at Sta. 1082, south of the lower pool of lock No. 8 and north of East street.

Embankment. Canal embankment has been made on the west side between Stas. 1049 and 1056, 1061 and 1081, 1083 and 1122, and 1187 and 1197. Along the east wall of lock No. 8 the embankment is about 75 per cent completed; on the west side about 66 per cent completed; and back of the northwest approach wall about 2,200 cubic yards have been placed.

Highway embankment between the new bridges over the Barge canal and Bond creek at East street is roughly completed.

Piles. The pile foundation for northwest approach wall to lock No. 8 has been completed and the piles driven for the southwest approach wall, where required, from the south end to Sta. 1148 + 88. Six sheet-piles were driven for wall in front of power plant of lock No. 8.

Concrete. Northwest approach wall to lock No. 8 has been completed and the southwest approach wall is nearly finished from Sta. 1149 + 26 to the south end.

Abutments for bridges over the Barge canal and Bond creek at East street are in place.

Wash wall. About 2,300 cubic yards of wash wall stone have been placed between Stations 1046 + 16 and 1055 + 00, 1064 + 50 and 1107 + 72, and 1107 + 87 and 1137 + 00, on the east side; and between Stations 1046 + 16 and 1053 + 00, and 1084 + 00 and 1096 + 50, on the west side. No coping or fine stone has been placed as yet.

Structural steel and cast iron. Fender fastenings are in place on the northwest and southwest approach walls at lock No. 8, where completed under this contract. Bridge material has been delivered for the plate girder bridges for the East street and Baldwin avenue crossings over Bond creek, but not erected.

Metal reinforcement. Reinforcing metal is in place in the abutments of the East street bridge over the Barge canal.

Maintaining traffic. Highway traffic has been maintained at temporary crossings over Bond creek at East street and Baldwin avenue, as well as over the Barge canal at East street.

The following is a summary of the items on contract No. 27-A, as they stand on September 30, 1911, as modified by alteration No. 1:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum		43.8%	43.8%	43.8	43.8
Grubbing.....cu. yds.	8,350	2,872	2,872	34.4	34.4
Excavation from spoil banks.....cu. yds.	182,000	35,881	35,881	19.7	19.7
All other excavation.....cu. yds.	360,000	34,985	34,985	9.7	9.7
Sheeting and bracing.....ft. B. M.	50,000	0	0	0	0
Forming embankment.....cu. yds.	161,900	30,941	30,941	19.1	19.1
Gravel lining.....cu. yds.	3,900	0	0	0	0
Sawed lumber.....ft. B. M.	20,000	0	0	0	0
Yellow pine in lock-gates.....ft. B. M.	7,000	0	0	0	0
White oak.....ft. B. M.	300	0	0	0	0
Foundation piles, 15 ft. long.....No.	880	68	68	7.7	7.7
Foundation piles, 20 ft. long.....No.	1,050	135	135	12.8	12.8
Sheet piling.....ft. B. M.	74,000	546	546	0.7	0.7
Second-class concrete.....cu. yds.	13,110	4,663	4,663	35.5	35.5
Reinforced concrete.....cu. yds.	1,070	120	120	11.2	11.2
Finishing concrete surfaces.....sq. ft.	10,000	60	60	0.6	0.6
Masonry bridge coping.....cu. yds.	14	0	0	0	0
Wash wall.....cu. yds.	27,360	2,337	2,337	8.5	8.5
Second-class stone paving.....sq. yds.	540	0	0	0	0
Third-class riprap.....cu. yds.	220	0	0	0	0
15-inch vitrified pipe.....lin. ft.	40	0	0	0	0
Structural steel.....lbs.	188,200	7,881	7,881	4.2	4.2
Metal reinforcement.....lbs.	65,000	13,710	13,710	21.1	21.1
Cast iron pipe.....lbs.	225,200	0	0	0	0
Iron castings.....lbs.	40,600	1,111	1,111	2.7	2.7
Wooden pavement.....sq. yds.	380	0	0	0	0
Wooden fencing.....lin. ft.	5,260	0	0	0	0
Lattice railing.....lin. ft.	265	0	0	0	0
Removing three old bridges.....lump sum		0	0	0	0
Maintaining traffic.....lump sum		4%	4%	4	4
Sluice-gate.....lump sum		0	0	0	0
Lowering Argyle St. Bridge.....lump sum		0	0	0	0
Maintaining traffic at Bond creek...lump sum		16.7%	16.7%	16.7	16.7

CHAMPLAIN CANAL, RESIDENCY NO. 3.

Resident Engineer D. B. LaDu reports:

Contract No. 25.

This contract provides for excavating the canal and protecting its sides, constructing lock No. 9 and necessary spillways, power plants and appertaining structures, bridge substructures and approaches, retaining walls, highways, and other incidental details between Sta. 356, about 0.6 mile north of Comstock post-office,

Washington county, and Sta. 1041+54, which is also Sta. 1046+16, at Dunhams Basin road, Washington county. The length of this contract is 13 miles. This contract was awarded to the Atlantic, Gulf & Pacific Company on November 19, 1906.

The main dredging has been completed from about 2½ miles south of lock No. 9 to the south end of the contract. The prism and side slopes have been swept and trimmed south to lock No. 9, with the exception of a small amount of sweeping to be done between Fort Ann and Brayton's bridge and a small amount of sloping to be completed for about one-half mile north of Smiths Basin to lock No. 9.

The wash wall has been placed from Dewey's bridge to about one mile north of Smiths Basin. There remains only a small amount of trimming in order to complete the wash wall, after the water has been lowered this fall.

The remaining rock to be excavated at the rock cuts between Dewey's bridge and Fort Ann has all been drilled and will be excavated after the close of navigation this fall.

The abutments for the Comstock highway bridge have been completed, with the exception of the slab approach. The bridge abutments and approaches for Dewey's bridge have been finished. The piles have been driven for the west abutment of Fort Ann bridge and a portion of the concrete placed.

The embankments have been finished for the two south approaches of lock No. 9. There still remains a small amount of work to be done in connection with the two north approaches. The balance of the work on the pile docking north of lock No. 9 has been completed.

During the past season the Barge canal has been used from the south end of contract No. 15 to the junction of the old canal at Fort Ann. The construction work has progressed very satisfactorily upon this contract during the past year, but the same amount of energy has not been used on contract No. 25 as on contract No. 15, as it was thought best to complete the portion of the canal between Whitehall and Fort Ann, which is being used for canal traffic. This, I believe, to be the proper procedure, as it will be impossible to use the Barge canal from Fort Ann to Dunhams Basin until after the completion of contract No. 27-A, contract No. 54 and contract No. 24, on the section immediately south of this contract.

The following is a summary for the year ended September 30, 1911:

ITEMS OF WORK.	Preliminary estimate as affected by alterations Nos. 1, 2, 3, 4, 5, 7 and 8.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	65.9	0	65.69	0	100
Grubbing.....cu. yds.	36,600	0	9,435	0	26
All excavation.....cu. yds.	5,595,800	593,708	4,835,777	16	86
Embankment.....cu. yds.	153,750	48,211	91,562	31	60
Lining.....cu. yds.	13,930	421	8,716	3	62
Sheeting and bracing.....ft. B. M.	79,700	16,623	18,774	21	23
Sawed lumber, hemlock.....ft. B. M.	2,800	0	2,570	0	92
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	151,800	110,884	142,823	73	94
White oak in miter-sills.....ft. B. M.	1,700	0	1,586	100	100
Piling.....No.	2,766	677	2,471	25	89
Sheet-piling.....ft. B. M.	1,249,000	0	1,022,066	0	82
Stone coping, first-class.....cu. yds.	15	10	10	100	100
Concrete, all classes.....cu. yds.	27,128	966	25,573	4	94
Wash wall.....cu. yds.	52,905	24,675	30,106	47	57
Riprap, all classes.....cu. yds.	6,245	723	2,326	11	37
Paving, second-class.....sq. yds.	3,097	0	15	0	1
Ballast.....cu. yds.	338	0	85	0	25
Cast iron, plain.....lbs.	27,890	0	22,931	0	82
Cast iron, machined.....lbs.	20,000	0	19,068	0	95
Metal reinforcement.....lbs.	68,395	11,496	45,470	17	66
Structural steel.....lbs.	58,780	14,884	39,319	25	67
Fender fastenings.....lbs.	283	0	263	93	93
Dry rubble masonry.....cu. yds.	3,080	298	298	9	9
Moving temporary bridge.....lump sum	$800	0	$800	100	100
Dressing face of wall.....lump sum	$350	0	$350	100	100
Gross estimate.....	$1,694,037	$206,134	$1,410,295	12	83

Contract No. 15.

This contract provides for excavating the canal and protecting its sides, constructing lock No. 11, dam No. 4, lock No. 12, dam No. 5, and appertaining structures, a spillway, a highway, two masonry culverts, five bridges with their piers and abutments, and other incidental details, between Lake Champlain at Whitehall, Washington county, Sta. 0 – 73, and Sta. 356 on Wood creek, about 0.6 mile north of Comstock post-office, Washington county. This contract was awarded to the Atlantic, Gulf & Pacific Co. on August 9, 1906. Its length is 6.8 miles, extending from Lake Champlain at Whitehall to a point about 0.6 mile north of Comstock.

At Whitehall the work on lock No. 12 was completed during the season when navigation was closed on the old Champlain canal.



BARGE CANAL, CONTRACT NO. 15.

View from the upper level, looking towards lock No. 11, Champlain canal, at Comstock. This lock was in operation during the sseason of 1911. At the extreme right there appears the bow of a boat approaching the lock.

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The work was carried on by about 500 men with three 8-hour shifts. The southwest approach wall was completed in the early summer, after navigation had opened.

The last section of dam No. 5 was completed and the movable crest erected last fall, before navigation closed.

During the last year, Clinton Ave., Saunders St. and Boardman St. bridges, in the vicinity of Whitehall, have been completed, with the exception of a small amount of paving and sidewalk on the Clinton Ave. bridge. In other words, all of the structures and prism have been completed in the vicinity of Whitehall, with the exception of a very small amount of excavation north of Saunders St. bridge and the erection of one isolated crib at the head of lock No. 12.

During the summer of 1911, from Whitehall south to Sta. 278, the prism and side slopes have been swept and trimmed and the wash wall placed. Between Whitehall and Sta. 278 there remains to be done only a small amount of trimming on the wash wall and cleaning one or two ditches, in order to complete this portion of the canal. At Sta. 278+10 the bridge and approaches have been completed.

From Sta. 278+10 to lock No. 11, the prism, side slopes and wash wall are nearly completed. There remains only about 4,000 ft. of wash wall and a small amount of trimming to be done, to complete the prism to lock No. 11.

The bridge and abutments at Sta. 331 have been completed, with the exception of erecting one span and finishing the approaches.

The embankments around lock No. 11 and approaches have been completed and about one-half of the trimming for the riprap in the by-pass at lock No. 11 has been completed. The grading for the highway on the west side of lock No. 11 has been completed and about three-quarters of the lining placed. The fencing along the highway on the west side of lock No. 11 has been about half completed.

At the present writing it looks as though contract No. 15 would be entirely completed and ready to be accepted by the State on or before December 1. The work on this contract has progressed

very satisfactorily during the past year and a large amount has been accomplished, although the estimates have not been very large, as it has been necessary to do a large amount of trimming over the entire contract. A large amount of the work which has been done in cleaning up during the past summer could have been avoided during the preceding years, as almost no trimming of banks, etc., was done until the present year. The work of trimming slopes and placing wash wall has been carried on with a large force of men, working two 8-hour shifts during the past summer.

This contract is much nearer completion than is shown by the monthly bulletin, as the percentage was figured from the rounded quantities in the preliminary estimate.

I desire to state that, if contract No. 15 is finished and turned over to the State this coming fall, the contract will be completed before the time limit expires.

The Delaware & Hudson Co. have finished a double track bridge across the Barge canal at Whitehall. This entire contract was open for Barge canal traffic on May 15, 1911. This, of course, made it necessary to operate both locks Nos. 11 and 12.

The construction work has progressed very satisfactorily throughout the past year.

The following is a summary for the year ended September 30, 1911, as affected by alterations Nos. 1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14 and 15:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	12.36	0	12.36	0	100
Grubbing.....cu. yds.	12,000	0	7,957	0	66
All excavation.....cu. yds.	2,921,400	162,721	2,636,793	5.5	90.2
Sheeting and bracing.....ft. B. M.	50,000	27,285	49,845	54.5	100
Embankment.....cu. yds.	167,500	32,322	95,723	19.3	57.1
Lining.....cu. yds.	3,992	1,161	1,781	29.2	44.9
Sawed lumber, hemlock.....ft. B. M.	40,000	6,843	26,904	17.1	67.2
Sawed lumber, spruce.....ft. B. M.	8,500	6,676	6,676	78.5	78.5
Sawed lumber, yellow pine or Douglas fir. ft. B. M.	108,500	53,132	72,340	48.9	66.7
Sawed lumber, white oak in miter-sills, ft. B. M.	4,430	949	3,868	21.4	87.3
Stone filling in cribs.....cu. yds.	850	0	567	0	67
Foundation piles.....No.	9,168	811	7,298	8.8	79.6
Fender piles.....No.	30	21	21	70	70
Sheet-piling.....ft. B. M.	100,740	0	87,412	0	87

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
All classes concrete.....cu. yds.	57,899	8,730	56,634	15	97.8
Dam coping.....cu. yds.	16	15	15	94	94
Bridge coping.....cu. yds.	12	7	7	58.3	58.3
Dry retaining wall.....cu. yds.	80	73	73	91.2	91.2
Wash wall.....cu. yds.	24,688	17,191	17,191	69.6	69.6
Third-class stone paving.....sq. yds.	2,187	518	529	23.7	24.1
Second-class riprap.....cu. yds.	1,150	0	225	0	19.5
Third-class riprap.....cu. yds.	7,390	2,672	2,672	36.2	36.2
Four-inch vitrified pipe.....lin. ft.	300	0	268	0	89
Iron castings.....lbs.	163,883	25,665	158,365	15.7	96.6
Iron castings, machined.....lbs.	50,000	0	48,604	0	97.2
Structural steel.....lbs.	1,227,083	885,983	984,765	72.2	80.2
Metal reinforcement.....lbs.	104,550	65,927	101,945	63	97.5
Portland cement sidewalk.....sq. ft.	4,350	308	308	7	7
Wooden block pavement.....sq. yds.	760	653	653	85.9	85.9
Wooden fencing.....lin. ft.	2,590	1,864	1,864	71.9	71.9
Ballast.....cu. yds.	160	59	61	36.8	38.1
Scroll railing.....lin. ft.	650	506	506	77.8	77.8
Upper lock-gates.....lump sum	$11,100	$5,550	$11,100	50	100
Lower lock-gates, lock No. 11...lump sum	$8,500	0	$8,500	0	100
Lower lock-gates, lock No. 12...lump sum	$9,900	0	$9,900	0	100
Needle-dams, lock No. 11.....lump sum	$5,200	0	$5,200	0	100
Needle-dam, upper end, lock No. 12, lump sum	$2,400	$1,344	$2,400	56	100
Needle-dam, lower end, lock No. 12, lump sum	$3,100	0	$3,100	0	100
Needle-dam, across head-race...lump sum	$700	0	$700	0	100
Lock-valves.....lump sum	$7,200		$7,200		100
Movable crest for dam No. 5...lump sum	$4,300	$4,300	$4,300	100	100
Red oak.....ft. B. M.	25,400	17,010	17,010	67	67

Contract No. 90.

This contract provides for furnishing and installing equipment for operating and lighting locks Nos. 9, 11 and 12 on the Champlain canal. This contract was let on April 12, 1910, to the D'Olier Engineering Co. of Philadelphia, Pa.

Lock No. 9. The power-house has been completed, with the exception of a small amount of work to be done on the roof. The conduit, both single and double duct, has been nearly completed, which includes the drilling in the lock walls. The checkered cover plates for recesses have been placed in position and the control cabinets and panel boards are in position on the lock walls.

Lock No. 11. The power-house has been completed, with the exception of a small amount of work to be done on the roof. The turbines and generators have been placed. The conduit, both single and double duct, has been completed, which includes all of the drilling in the lock walls. The cable for the main feeders and control lines have been drawn, but none of the splices made. The

gate and valve-operating machinery is nearly installed and the control panels and cabinets are nearly all in position.

Lock No. 12. The power-house floor has been placed and the forms nearly completed for the walls. The turbines and generators have been installed. All of the conduit, both single and double duct, has been finished, which includes all of the drilling in the lock walls. The control panels and cabinets are placed in position on the lock walls and the gate and valve-operating machinery and capstans are nearly completed.

The lamp poles and checkered cover plate have been completed. The hand-operating machinery for operating the valves and gates has been completed on both locks Nos. 11 and 12. Canal traffic being turned into the new Barge canal on May 15 of this year, made it necessary to use both locks Nos. 11 and 12. Therefore it was necessary to install hand-operating machinery to operate these two locks. The hand-operating machinery has worked very satisfactorily up to the present writing.

Contract No. 16.

This contract provides for the construction of certain bridges on the site of contract No. 25. The contract was awarded to the United Construction Co.

Shop drawings have been prepared and approved and the material is now in the shops, being fabricated.

The Comstock highway bridge is nearly ready for shipment. The erection of these bridges will be carried on during the present winter.

Contract No. 33.

This contract provides for erecting and constructing the operating machinery for the movable dam at Whitehall. The contract was awarded to the Penn Bridge Co. on January 7, 1910.

A portion of the machinery has been placed on the upper chord of the Clinton Ave. bridge and the forms constructed for the counterweights. The balance of the machinery has been shipped and will be placed in a very short time.

THE FOLLOWING STATEMENTS SHOW THE NAMES, RANK AND COMPENSATION OF ENGINEERS EMPLOYED IN THE EASTERN DIVISION OF THE DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR, TOGETHER WITH INCIDENTAL EXPENSES, FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Ordinary Repairs to Canals — Erie Canal.

Chapter 512, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Geo. D. Williams	Division engineer	$4,200 per year	$1,050 00		$1,050 00
J. A. O'Connor	Division engineer	4,200 per year	2,800 00		2,800 00
R. D. Parsons	Financial clerk	150 per month	580 00		580 00
Hugh Reilly	Cashier	150 per month	300 00		300 00
Hattie A. Dell	Stenographer	100 per month	400 00		400 00
R. G. Finch	Assistant engineer	6 00 per day	150 00	$2 50	152 50
Frank Roberts	Rodman	4 00 per day	452 00		452 00
			$5,732 00	$2 50	$5,734 50
Incidental Expenses.					
Stationery and printing				$14 15	
Fuel and light				315 50	
Postage				416 00	
Telephone and telegraph				1,150 25	
Miscellaneous				370 88	
					2,266 78
Total					$8,001 28

Ordinary Repairs to Canals — Champlain Canal.

Chapter 512, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
R. D. Parsons	Financial clerk	$150 per month	$450 00		$450 00
Hugh Reilly	Cashier	150 per month	450 00		450 00
Hattie A. Dell	Stenographer	100 per month	200 00		200 00
Geo. Schillner	Engineering draftsman	5 00 per day	80 00		80 00
R. G. Finch	Assistant engineer	6 00 per day	54 00	$2 80	56 80
Frank Roberts	Rodman	4 00 per day	228 00		228 00
T. E. Bowen	Axeman and office assistant	2 50 per day	7 00		7 00
			$1,469 00	$2 80	$1,471 80
Incidental Expenses.					
Stationery and printing				$29 50	
Fuel and light				295 80	
Postage				378 40	
Telephone and telegraph				1,265 51	
Miscellaneous				557 71	
					2,526 92
Total					$3,998 72

Construction of Barge Canal — Head Office Account.

Chapter 147, Laws of 1903, and amendatory laws.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Alex. E. Kastl	Special deputy state engineer	$6,000 per year	$4,145 16	$252 07	$4,397 23
William B. Landreth	Special deputy state engineer	6,000 per year	1,741 94	46 53	1,788 47
M. G. Barnes	Consulting engineer	60 per day when employed	900 00	42 60	942 60
W. H. Burr	Consulting engineer	60 per day when employed	240 00	50 10	290 10
Joseph Ripley	Consulting engineer	600 per month	1,316 13	48 72	1,364 85
T. K. Thomson	Consulting engineer	60 per day, when employed	210 00	53 25	263 25
G. F. Stickney	Supervising engineer	5,000 per year	4,638 90	213 18	4,852 08
W. H. Yates	Supervising engineer	4,000 per year	1,275 97	96 22	1,372 19
H. D. Alexander	Special resident engineer	4,000 per year	3,249 99	183 17	3,433 16
R. S. Greenman	Resident engineer	3,000 per year	2,950 00	2,625 83	5,575 83
E. D. Hendricks	Resident engineer	2,400 per year	425 81	5 23	431 04
R. E. Horton	Resident engineer	3,000 per year	2,678 97	1,487 49	4,166 46
C. H. MacCulloch	Resident engineer	2,700 per year	2,700 00		2,700 00
R. E. Phillips	Resident engineer	2,400 per year	300 00		300 00
Noble E. Whitford	Resident engineer	3,000 per year	3,000 00	66 38	3,066 38
W. G. Wildes	Resident engineer	2,700 per year	2,675 00		2,675 00
William R. Davis	Chief bridge designer	375 per month	3,846 43	135 90	3,982 33
G. M. Braune	Assistant chief bridge designer	250 per month	2,378 23	8 77	2,387 00
John Bartholomew	Bridge designer	175 per month	350 00		350 00
E. A. Brainerd	Bridge designer	175 per month	1,812 10		1,812 10
J. C. Green	Bridge designer	175 per month	2,015 32		2,015 32
C. N. Haggart	Bridge designer	175 per month	2,100 00	14 46	2,114 46
A. G. Hayden	Bridge designer	175 per month	1,608 03	40 02	1,648 05
Harold Levy	Bridge designer	175 per month	1,963 95		1,963 95
H. D. Miller	Bridge designer	175 per month	2,020 02	9 02	2,029 04
E. L. Pierce	Bridge designer	150 per month	150 00		150 00
J. C. Podmore	Bridge designer	150 per month	1,474 68		1,474 68
J. M. C. Quarles de Quarles	Bridge designer	150 per month	1,746 77		1,746 77
H. J. Scheuermann	Bridge designer	175 per month	1,814 92		1,814 92
E. G. Semon	Bridge designer	125 per month	1,459 68		1,459 68
J. E. Tonnelier	Bridge designer	150 per month	55 00		55 00
L. C. West	Bridge designer	150 per month	150 00		150 00
C. H. Wood	Bridge designer	175 per month	1,962 64	13 60	1,976 24
I. S. Abrahams	Bridge draftsman	125 per month	1,365 73		1,365 73
J. M. Angus	Bridge draftsman	125 per month	1,252 02		1,252 02
J. H. Dugan	Bridge draftsman	1,201 per year	1,184 52		1,184 52
L. H. Friedman	Bridge draftsman	1,201 per year	542 91		542 91
A. C. Miller	Bridge draftsman	100 per month	314 84		314 84
J. A. Pritchard	Junior bridge draftsman	100 per month	697 50		697 50
C. E. Quimby	Junior bridge draftsman	90 per month	988 55		988 55
E. E. Briggs	Junior bridge draftsman	100 per month	1,200 00		1,200 00
J. F. Blaise	Junior bridge draftsman	90 per month	963 00		963 00
C. C. Egbert	Expert on electrical design	20 per day when employed	1,980 00	95 72	2,075 72
E. F. Van Hoesen	Expert on R. R. crossings	4,500 per year	1,125 00	72 33	1,197 33
D. A. Watt	Expert on movable dams	5,000 per year	2,972 22	375 58	3,329 80
J. T. Durham	Confidential assistant	333 33 per month	999 99	162 72	1,162 71
Thomas Hassett	Confidential assistant	333 33 per month	2,999 97	495 31	3,495 28
J. H. McElroy	Chief clerk	225 per month	2,650 00	262 75	2,912 75
H. E. Breed	Financial clerk and auditor	250 per month	747 94	93 91	841 85
F. R. Clair	Financial clerk and auditor	250 per month	2,000 00	382 11	2,382 11
J. M. Smelzer	Index clerk	135 per month	1,620 00		1,620 00
Parkes D. Wendell	Estimate clerk	200 per month	100 00	20 61	120 61
C. B. Dunham, Jr	Clerk	125 per month	1,062 50	11 95	1,074 45
J. T. Gorman	Clerk	112 50 per month	1,302 22		1,302 22
J. C. Guffin	Clerk	112 50 per month	1,350 00		1,350 00
J. E. Minnock	Clerk	100 00 per month	1,183 33		1,183 33
George W. Ruso	Clerk	112 50 per month	1,293 75		1,293 75
George T. Waterman	Clerk	80 per month	960 00		960 00
Grace Brennan	Stenographer	75 per month	186 29		186 29
Nelle Clark	Stenographer	100 per month	1,200 00		1,200 00
Adelle Hallenbeck	Stenographer	83 33 per month	999 96		999 96
Grace Haswell	Stenographer	83 33 per month	991 63		991 63
Bertha E. Kirchner	Stenographer	75 per month	870 00		870 00
S. C. MacNeil	Stenographer	100 per month	1,200 00		1,200 00
Kathryn Riley	Temporary stenographer	60 per month	1 94		1 94
J. J. Tobin	Stenographer	75 per month	1,050 00		1,050 00

Construction of Barge Canal — Head Office Account — (Cont'd).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Cleora Van Vleck	Stenographer	$100 per month	$1,200 00		$1,200 00
Anna M. Weber	Stenographer	60 per month	396 77		396 77
Mabel Weinhols	Stenographer	100 per month	1,100 00		1,100 00
Sampson Brettheimer	Engineering draftsman	4 50 per day	279 00		279 00
J. M. Keenan	Engineering draftsman	5 00 per day	470 00		470 00
G. D. Meer	Engineering draftsman	5 00 per day	1,565 00		1,565 00
J. H. McCormick, Jr.	Engineering draftsman	5 00 per day	1,175 00		1,175 00
J. A. O'Donnell	Engineering draftsman	5 00 per day	1,565 00		1,565 00
W. J. Picard	Engineering draftsman	5 00 per day	1,565 00		1,565 00
G. L. Schillner	Engineering draftsman	5 00 per day	1,130 00		1,130 00
J. L. Southworth	Engineering draftsman	5 00 per day	880 00		880 00
J. H. Stevens	Engineering draftsman	5 00 per day	875 00		875 00
S. T. Vosburgh	Engineering draftsman	4 00 per day	1,260 00		1,260 00
L. B. Westfall	Engineering draftsman	5 00 per day	945 00		945 00
J. J. Cosgrave	Architectural draftsman	125 per month	1,185 48		1,185 48
R. R. Shearer	Architectural draftsman	125 per month	875 00	$5 92	880 92
F. E. Blake	Mechanical engineer	175 per month	2,082 50	21 70	2,104 20
J. A. Jensen	Mechanical draftsman	100 per month	1,087 21		1,087 21
W. S. Klos	Mechanical draftsman	125 per month	1,475 00		1,475 00
C. P. Wiweke	Mechanical draftsman	100 per month	1,200 00		1,200 00
T. L. Ainsworth	Tracer	75 per month	863 31		863 31
R. B. Allen	Tracer	75 per month	633 97		633 97
Leroy Bamer	Tracer	75 per month	639 85		639 85
J. H. Forth	Tracer	75 per month	900 00		900 00
Bernard Gasier	Tracer	75 per month	890 32		890 32
W. J. Henk	Tracer	50 per month	100 00		100 00
C. T. Kniskern, Jr.	Tracer	75 per month	851 61		851 61
Chas. Messina	Tracer	75 per month	870 81		870 81
P. R. Murray	Tracer	75 per month	825 00		825 00
H. F. Reed	Tracer	50 per month	216 13		216 13
J. J. Ryan	Tracer	60 per month	448 85		448 85
P. C. Ashley	Assistant engineer	6 00 per day	1,638 00	13 11	1,651 11
H. W. Benedict	Assistant engineer	6 00 per day	336 00	2 63	338 63
Joseph Brady	Assistant engineer	162 50 per month	337 77		337 77
Clark Brown	Assistant engineer	6 00 per day	1,902 00	5 75	1,907 75
A. T. Clark	Assistant engineer	5 00 per day	1,485 00		1,485 00
A. W. Connor	Assistant engineer	6 00 per day	792 00		792 00
D. H. Daley	Assistant engineer	6 00 per day	1,878 00		1,878 00
F. M. Eames	Assistant engineer	6 00 per day	1,878 00		1,878 00
R. G. Finch	Assistant engineer	6 00 per day	1,056 00	29 81	1,085 81
H. A. Gehring	Assistant engineer	6 00 per day	1,488 00		1,488 00
M. W. Grimes	Assistant engineer	6 00 per day	520 00		520 00
G. H. Haley	Assistant engineer	6 00 per day	336 00	6 36	342 36
R. L. Holt	Assistant engineer	6 00 per day	1,914 00	13 03	1,927 03
H. C. Kline	Assistant engineer	6 00 per day	102 00		102 00
D. R. Lee	Assistant engineer	6 00 per day	942 00		942 00
O. F. Lewis	Assistant engineer	6 00 per day	1,878 00	24 41	1,902 41
Jas. B. Maguire	Assistant engineer	6 00 per day	684 00		684 00
I. S. Matlaw	Assistant engineer	6 00 per day	1,650 00		1,650 00
C. W. Morris, Jr.	Assistant engineer	6 00 per day	1,896 00		1,896 00
C. D. Murray	Assistant engineer	6 00 per day	762 00		762 00
E. P. Neuschwander	Assistant engineer	6 00 per day	1,914 00		1,914 00
J. P. Newton	Assistant engineer	6 00 per day	1,878 00		1,878 00
R. E. Phillips	Assistant engineer	6 00 per day	246 00	15 21	261 21
E. G. Raynor	Assistant engineer	6 00 per day	1,818 00	8 37	1,826 37
Harry Shoemaker	Assistant engineer	6 00 per day	132 00		132 00
W. H. Slingerland	Assistant engineer	6 00 per day	1,878 00		1,878 00
G. W. Stickney	Assistant engineer	6 00 per day	906 00		906 00
Rupert Sturtevant	Assistant engineer	6 00 per day	1,649 00	26 51	1,675 51
G. G. Underhill	Assistant engineer	6 00 per day	1,908 00	194 82	2,102 82
H. A. Weeks	Assistant engineer	6 00 per day	1,902 00	3 86	1,905 86
H. T. Arnold	Leveler	5 00 per day	1,565 00	7 52	1,572 52
R. N. Barrett	Leveler	5 00 per day	1,529 00		1,529 00
N. E. Cottrell	Leveler	4 50 per day	1,435 50		1,435 50
Eli Gamse	Leveler	4 50 per day	873 00		873 00
J. A. Glominski	Leveler	5 00 per day	121 50		121 50
L. L. Hadley	Leveler	4 50 per day	121 50		121 50
R. W. Smith	Leveler	4 50 per day	868 50		868 50
H. S. Sparr	Leveler	5 00 per day	225 00		225 00
G. G. Sweet	Leveler	5 00 per day	1,575 00		1,575 00
S. R. Tighe	Leveler	5 00 per day	1,040 00		1,040 00
J. A. Wallace	Leveler	4 50 per day	877 50		877 50

Construction of Barge Canal — Head Office Account — (Cont'd).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
T. L. Watkins	Leveler	$5 00 per day	$1,565 00	$3 46	$1,568 46
C. H. Swick	Leveler	4 50 per day	94 50		94 50
J. F. Back	Rodman	3 50 per day	126 00		126 00
Jacob Bendel	Rodman	4 00 per day	774 00		774 00
W. L. Blaum	Rodman	3 50 per day	476 00		476 00
M. H. Boigel	Rodman	3 50 per day	1,089 50		1,089 50
H. V. Button	Rodman	3 50 per day	844 50		844 50
P. S. L. Bolger	Rodman	3 50 per day	108 50		108 50
Wayland Dickens	Rodman	3 50 per day	868 00	2 08	870 08
H. F. Hills	Rodman	3 50 per day	266 00		266 00
G. B. Kelly	Rodman	3 50 per day	1,106 00		1,106 00
F. M. Kuchar	Rodman	3 50 per day	220 50		220 50
E. H. Leggett	Rodman	3 50 per day	7 00		7 00
John Lyons	Rodman	3 50 per day	574 00		574 00
J. T. Murphy	Rodman	3 50 per day	1,106 50	5 85	1,112 35
A. R. Patchke	Rodman	4 00 per day	992 00		992 00
Frank Roberts	Rodman	4 00 per day	188 00		188 00
H. D. Schutt	Rodman	3 50 per day	535 50		535 50
Raymond Shelley	Rodman	4 00 per day	900 00	4 33	904 33
Bernard Wich	Rodman	3 50 per day	469 00	1 48	470 48
M. S. Bierce	Inspector of masonry	5 00 per day	1,565 00		1,565 00
J. M. Taylor	Inspector of masonry	4 50 per day	1,318 50	1 15	1,319 65
C. G. Hadley	Electrical inspector	150 per month	1,722 58	509 21	2,231 79
C. F. Bidgood	Chainman	2 50 per day	35 00		35 00
K. M. Boutelle	Chainman	2 50 per day	432 50	53 10	485 60
J. S. Burns	Chainman	3 00 per day	840 00		840 00
J. E. Cotter	Chainman	2 50 per day	7 50		7 50
George Deutschbeim	Chainman	2 50 per day	155 00		155 00
W. H. Dodd	Chainman	3 00 per day	375 00		375 00
H. F. Eagan	Chainman	3 00 per day	168 00		168 00
William Ginsberg	Chainman	3 00 per day	619 00		619 00
N. B. Robbins	Chainman	3 00 per day	876 00		876 00
D. F. Allen	Laborer	2 00 per day	668 00		668 00
Wm. Atkinson	Laborer	2 00 per day	674 00		674 00
L. R. Baldwin	Laborer	2 00 per day	402 00		402 00
A. M. Barton	Laborer	2 00 per day	422 00		422 00
J. H. Boyland	Laborer	2 00 per day	626 00		626 00
M. E. Brainerd	Laborer	2 00 per day	622 00		622 00
J. M. Connolly	Laborer	2 00 per day	522 00		522 00
J. E. Collins	Laborer	2 00 per day	128 00		128 00
G. E. Cumner	Laborer	2 00 per day	254 00		254 00
George Cunningham	Laborer	2 00 per day	256 00		256 00
Patrick Degnan	Laborer	2 00 per day	410 00		410 00
R. J. Dobbins	Laborer	2 00 per day	62 00	65	62 65
Michael Dolan	Laborer	2 00 per day	146 00		146 00
James Farley	Laborer	2 00 per day	316 00		316 00
Peter Farnan	Laborer	2 00 per day	414 00		414 00
S. A. Feenan	Laborer	2 00 per day	142 00		142 00
J. M. Fogarty	Laborer	2 00 per day	148 00		148 00
C. H. Goelts	Laborer	2 00 per day	212 00	2 48	214 48
James Haley	Laborer	2 00 per day	298 00		298 00
E. W. Hiser	Laborer	2 00 per day	56 00		56 00
G. W. Linden	Laborer	2 00 per day	230 00		230 00
Myer Livingston	Laborer	2 00 per day	376 00		376 00
Simeon Lodewick	Laborer	2 00 per day	648 00		648 00
J. M. MacDonald	Laborer	2 00 per day	626 00		626 00
W. T. McCormick	Laborer	2 00 per day	210 00		210 00
F. W. McEnaney	Laborer	2 00 per day	398 00		398 00
Henry McFarlane	Laborer	2 00 per day	686 00		686 00
P. J. McGoldrick	Laborer	2 00 per day	384 00		384 00
Leopold Miller	Laborer	2 00 per day	314 00		314 00
L. E. Moore	Laborer	2 00 per day	254 00		254 00
Joseph Murray	Laborer	2 00 per day	314 00		314 00
Leonard Paige	Laborer	2 00 per day	60 00	61 68	121 68
Thomas Ratoone	Laborer	2 00 per day	652 00		652 00
P. J. Ryan	Laborer	2 00 per day	378 00		378 00
W. J. Smith	Laborer	2 00 per day	640 00		640 00
H. J. Souls	Laborer	2 00 per day	264 00		264 00
Julius Stern	Laborer	2 00 per day	256 00		256 00
H. A. Sweeney	Laborer	2 00 per day	396 00		396 00
Cuyler Ten Eyck	Laborer	2 00 per day	192 00		192 00
Michael Tierney	Laborer	2 00 per day	626 00		626 00

Construction of Barge Canal Head Office Account — (Concl'd).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
M. A. Tierney	Laborer	$2 00 per day	$410 00		$410 00
A. F. Wilson	Laborer	2 00 per day	404 00		404 00
M. E. Baker	Axeman and office assistant	2 50 per day	786 00		786 00
T. E. Bowen	Axeman and office assistant	2 50 per day	465 00		465 00
P. F. Burmaster	Axeman and office assistant	2 50 per day	678 50		678 50
G. B. Fitzgerald	Axeman and office assistant	2 50 per day	800 00		800 00
W. V. T. Fonda	Axeman and office assistant	2 50 per day	104 00		104 00
Edgar Hull	Axeman and office assistant	2 50 per day	532 50		532 50
J. J. Murnane	Axeman and office assistant	2 50 per day	768 00		768 00
P. D. Unger	Axeman and office assistant	2 50 per day	768 00		768 00
Sibella Carroll	Charwoman	1 25 per day	391 25		391 25
E. M. Chamberlain	Night watchman	80 per month	960 00		960 00
Cornelius Coutant	Night watchman (temporary)	80 per month	64 52		64 52
Frank M. Hill	Title maker	120 per month	1,440 00		1,440 00
F. C. Batt	Chauffeur	100 per month	1,200 00	$404 71	1,604 71
W. H. Kehoe	Chauffeur	100 per month	117 74	1 64	119 38
Lasarus Loria	Chauffeur	100 per month	250 00	85 54	335 54
H. W. Nutter	Chauffeur	100 per month	100 00	90 89	190 89
E. H. Wetsel	Foreman of public works	5 00 per day	1,300 00		1,300 00
			$222,845 62	$8,954 79	$231,800 41
Incidental Expenses.					
Instruments, tools and appliances				$221 44	
Office rent				4,423 08	
Fuel and light				201 00	
Stationery and printing				7,716 77	
Postage				1,189 73	
Telephone and telegraph				2,190 91	
Miscellaneous				18,072 53	
					34,015 46
Total					$265,815 87

Construction of Barge Canal — Erie Canal.

Chapter 147, Laws of 1903, and amendatory laws.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
J. A. O'Connor	Division engineer	$4,200 per year	$500 00	$719 90	$1,219 90
Geo. D. Williams	Division engineer	4 200 per year		34 24	34 24
P. H. Dater	Resident engineer	3 000 per year	2,975 00	506 52	3,481 52
Carleton Greene	Resident engineer	3 000 per year	2,000 00	135 51	2,135 51
E. D. Hendricks	Resident engineer	2,400 per year	1,974 19	141 87	2,106 06
E. A. Lamb	Resident engineer	2,700 per year	2,700 00	366 42	3,066 42
E. J. Pickwick	Resident engineer	3,000 per year	1,000 00	117 93	1,117 93
S. M. Savage	Resident engineer	3,000 per year	439 51	85 19	524 70
A. E. Steere	Resident engineer	2,400 per year	1,412 90	95 74	1,508 64
H. O. Schermerhorn	Resident engineer	2,700 per year	2,675 00	143 48	2,818 48
Earle Talbot	Resident engineer	3,000 per year	1,000 00	299 54	1,299 54
F. P. Williams	Resident engineer	3,000 per year	40 32	9 21	49 53
H. E. Brainard	Bridge designer	175 per month	1,196 21	189 42	1,385 63
L. H. Hurd	Clerk	112 50 per month	54 44		54 44
Arthur Rosenchild	Clerk	75 00 per month	180 00	14 92	194 92
Parkes D. Wendell	Estimate clerk	200 00 per month	1,200 00	30 35	1,230 35
Hattie A. Dell	Stenographer	100 00 per month	400 00		400 00
P. J. Gaffey	Stenographer	60 00 per month	700 00		700 00
J. A. Murray	Stenographer	83 33 per month	983 30		983 30
Georgina Pflaum	Stenographer	75 00 per month	237 50		237 50
J. A. Galvin	Engineering draftsman	5 00 per day	1,370 00	21 19	1,391 19
E. C. Hackett	Engineering draftsman	5 00 per day	1,695 00		1,695 00

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
E. L. Keeler	Engineering draftsman	$5 00 per day	$1,615 00	$4 90	$1,619 90
T. L. Ainsworth	Tracer	75 per month	24 19		24 19
A. G. Austin	Assistant engineer	6 00 per day	2,082 00	256 74	2,338 74
E. J. Becker	Assistant engineer	6 00 per day	1,998 00	164 44	2,162 44
J. C. Bell	Assistant engineer	6 00 per day	2,052 00	422 45	2,474 45
Lewis Bartlett	Assistant engineer	6 00 per day	2,058 00	200 79	2,258 79
H. W. Benedict	Assistant engineer	6 00 per day	42 00		42 00
C. R. Chase	Assistant engineer	6 00 per day		8 00	8 00
R. G. Finch	Assistant engineer	6 00 per day	156 00	6 35	162 35
M. W. Grimes	Assistant engineer	5 00 per day	850 00		850 00
Oscar Hasbrouck	Assistant engineer	6 00 per day	858 00	1 30	859 30
Ford W. Harris	Assistant engineer	5 00 per day	1,700 00		1,700 00
M. E. James	Assistant engineer	6 00 per day	2,064 00	170 02	2,234 02
H. C. Kline	Assistant engineer	6 00 per day	1,932 00	198 12	2,130 12
E. E. Kendall	Assistant engineer	6 00 per day	1,986 00	180 87	2,166 87
G. I. Oakley	Assistant engineer	6 00 per day	2,010 00	1,161 50	3,171 50
D. W. Overocker	Assistant engineer	6 00 per day	1,775 00	9 95	1,784 95
C. G. Ranney	Assistant engineer	5 50 per day	1,627 50		1,627 50
G. W. Stickney	Assistant engineer	6 00 per day	1,008 00	8 51	1,016 51
M. W. Williams	Assistant engineer	6 00 per day	2,034 00	459 08	2,493 08
W. J. Weigmann	Assistant engineer	6 00 per day	2,046 00	489 99	2,535 99
W. R. Abbott	Leveler	4 50 per day	1,498 50		1,498 50
E. M. Babcock	Leveler	5 00 per day	130 00		130 00
Harold Bills	Leveler	5 00 per day	1,307 00		1,307 00
S. R. Bellows	Leveler	5 00 per day	1,665 00	614 30	2,279 30
T. S. Bailey	Leveler	5 00 per day	1,620 00	63 17	1,683 17
W. W. Brown	Leveler	5 00 per day	1,452 00		1,452 00
C. R. De Graff	Leveler	5 00 per day	1,580 00	103 47	1,683 47
R. E. Drake	Leveler	4 50 per day	841 50		841 50
A. C. Eaton	Leveler	5 00 per day	555 00		555 00
E. Hulsapple	Leveler	5 00 per day	1,590 00		1,590 00
Grant Huntley	Leveler	5 00 per day	1,655 00		1,655 00
C. L. Hayward	Leveler	5 00 per day	1,700 00		1,700 00
A. D. Hyman	Leveler	4 50 per day	1,458 00		1,458 00
G. C. Ingersoll	Leveler	5 00 per day	1,670 00		1,670 00
G. H. Jones	Leveler	4 50 per day	1,467 00		1,467 00
C. A. Lansing	Leveler	5 00 per day	1,620 00		1,620 00
A. T. Madison	Leveler	4 50 per day	1,462 50		1,462 50
W. N. Niles	Leveler	4 50 per day	1,416 50		1,416 50
H. P. O'Bryan	Leveler	4 50 per day	1,301 00		1,301 00
R. B. Smith	Leveler	5 00 per day	1,326 00		1,326 00
Bernard Wich	Leveler	5 00 per day	566 00		566 00
W. E. Weller	Leveler	5 00 per day	35 00	16 96	51 96
J. D. Williams	Leveler	5 00 per day	1,710 00		1,710 00
L. H. M. Whitney	Leveler	5 00 per day	1,735 00	118 81	1,853 81
F. C. Armstrong	Rodman	3 50 per day	673 00	23 97	696 97
A. C. Atkin	Rodman	3 50 per day	346 50		346 50
R. G. Baker	Rodman	3 50 per day	518 00		518 00
J. P. Byrne	Rodman	3 50 per day	567 00		567 00
L. R. Bennett	Rodman	3 50 per day	59 50		59 50
C. E. Burleigh	Rodman	3 50 per day	556 50		556 50
Wayland Dickens	Rodman	3 50 per day	136 50		136 50
C. S. Dietz	Rodman	4 00 per day	420 00		420 00
E. W. Goff	Rodman	4 00 per day	1,340 00		1,340 00
Max Goodman	Rodman	3 50 per day	175 00		175 00
E. E. Hebert	Rodman	3 50 per day	210 00		210 00
A. O. Hollenbeck	Rodman	4 00 per day	1,187 50		1,187 50
H. W. Jewell	Rodman	4 00 per day	1,268 00		1,268 00
W. N. Langworthy	Rodman	3 50 per day	262 50		262 50
T. J. Loonie	Rodman	4 00 per day	1,167 50		1,167 50
S. C. Luce	Rodman	3 50 per day	584 50		584 50
E. F. Ludden	Rodman	3 50 per day	612 50		612 50
L. Y. Mencoly	Rodman	4 00 per day	1,261 50		1,261 50
A. R. Mulligan	Rodman	4 00 per day	1,233 00		1,233 00
A. D. Merrill	Rodman	3 50 per day	1,200 50		1,200 50
Chester Moore	Rodman	3 50 per day	1,144 50		1,144 50
W. C. R. Pyne	Rodman	4 00 per day	536 00		536 00
A. R. Patchke	Rodman	4 00 per day	284 00		284 00
L. C Purdy	Rodman	3 50 per day	1,003 50		1,003 50
S. M. Poutier	Rodman	3 50 per day	1,137 50		1,137 50
Frank Roberts	Rodman	4 00 per day	24 00		24 00
H. J. Richardson	Rodman	4 00 per day	656 00	166 84	822 84

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Wm. Robinson	Rodman	$3 50 per day	$714 00		$714 00
C. P. Riley	Rodman	3 50 per day	1,159 50		1,159 50
R. Shelley	Rodman	4 00 per day	260 00		260 00
C. E. Smith	Rodman	4 00 per day	1,199 50		1,199 50
C. V. Smith	Rodman	3 50 per day	1,190 00		1,190 00
J. R. Tighe	Rodman	3 50 per day	1,137 00		1,137 00
F. L. Teall	Rodman	3 50 per day	1,096 00		1,096 00
R. G. Williams	Rodman	3 50 per day	1,116 50		1,116 50
C. A. Wilbur	Rodman	3 50 per day	1,043 00		1,043 00
A. F. Bayly	Chainman	2 50 per day	815 00		815 00
T. M. Brassel	Chainman	3 00 per day	907 00		907 00
J. G. Bushnell	Chainman	3 00 per day	1,026 00		1,026 00
F. S. Belotti	Chainman	2 50 per day	791 00		791 00
P. E. Collette	Chainman	3 00 per day	999 50		999 50
L. C. Case	Chainman	3 00 per day	147 00		147 00
H. L. Du Bois	Chainman	2 50 per day	47 50		47 50
Wm. A. Dawson	Chainman	3 00 per day	833 50		833 50
G. P. Edwards	Chainman	2 50 per day	62 50		62 50
Elias Einhorn	Chainman	2 50 per day	12 50		12 50
F. B. Faille	Chainman	3 00 per day	990 00		990 00
F. E. Gillen	Chainman	3 00 per day	984 00		984 00
W. M. Griffith	Chainman	3 00 per day	1,032 00		1,032 00
Pincus Greenbaum	Chainman	2 50 per day	709 50		709 50
F. E. Hardy	Chainman	2 50 per day	110 00		110 00
J. Helfand	Chainman	3 00 per day	840 50		840 50
W. J. Healy	Chainman	2 50 per day	85 00		85 00
R. Jerrell	Chainman	3 00 per day	81 00		81 00
J. A. Kelley	Chainman	2 50 per day	817 50		817 50
R. L. Kelley	Chainman	3 00 per day	895 00		895 00
A. A. Laughlin	Chainman	3 00 per day	219 00		219 00
G. H. Leet	Chainman	2 50 per day	860 00		860 00
Geo. Levy	Chainman	2 50 per day	372 50		372 50
W. J. Lewis	Chainman	2 50 per day	135 00		135 00
Wm. H. McMahon	Chainman	3 00 per day	543 50		543 50
J. J. MacDonald	Chainman	3 00 per day	868 50		868 50
Wm. Mangan	Chainman	2 50 per day	767 50		767 50
L. A. McElveney	Chainman	2 50 per day	135 00		135 00
W. C. Ruland	Chainman	2 50 per day	147 50		147 50
Jacob Reubin	Chainman	2 50 per day	460 00		460 00
G. R. Rankin	Chainman	3 00 per day	947 00		947 00
J. B. Sullivan	Chainman	3 00 per day	505 00		505 00
R. W. Stewart	Chainman	2 50 per day	362 50		362 50
C. B. Tebo	Chainman	3 00 per day	1,008 00		1,008 00
H. J. Waldvogel	Chainman	3 00 per day	966 00		966 00
C. L. Weil	Chainman	2 50 per day	165 00		165 00
J. A. Young	Chainman	3 00 per day	963 00		963 00
A. M. Wait	Inspector of public works	5 00 per day	1,640 00		1,640 00
E. V. Allendorph	Inspector of masonry	5 00 per day	225 00		225 00
J. A. Cahalin	Inspector of masonry	4 50 per day	1,494 00		1,494 00
H. B. Finan	Inspector of masonry	4 50 per day	1,521 00		1,521 00
W. H. Klinkhart	Inspector of masonry	5 00 per day	1,695 00		1,695 00
Wm. P. Lynch	Inspector of masonry	5 00 per day	1,725 00		1,725 00
S. Y. MacGregor	Inspector of masonry	5 00 per day	1,795 00		1,795 00
T. M. Oliver	Inspector of masonry	5 00 per day	1,695 00		1,695 00
James Sim	Inspector of masonry	5 00 per day	1,595 00		1,595 00
J. M. Taylor	Inspector of masonry	4 50 per day	76 50		76 50
T. B. Bowes	Foreman of borings	4 00 per day	280 00		280 00
J. J. McManus	Foreman of borings	4 50 per day	18 00	$12 96	30 96
F. H. Palmer	Foreman of borings	4 00 per day	24 00	15 76	39 76
J. J. Murphy	Movable dam tender	100 per month	66 67		66 67
Michael Murphy	Movable dam tender	100 per month	290 00		290 00
W. M. Cook	Boatman	3 00 per day	585 00		585 00
E. L. Casey	Boatman	3 00 per day	337 50		337 50
P. J. Doorey	Boatman	3 00 per day	594 00		594 00
C. B. Davis	Boatman	3 00 per day	237 00		237 00
E. A. Faille	Boatman	3 00 per day	408 00		408 00
E. J. Farrell	Boatman	3 00 per day	519 00		519 00
M. F. Guerin	Boatman	3 00 per day	597 00		597 00
James Holton	Boatman	3 00 per day	582 00		582 00
Thomas Keane	Boatman	3 00 per day	369 00		369 00
James Lair	Boatman	3 00 per day	564 00		564 00

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
M. E. Mullaney	Boatman	$3 00 per day	$630 00		$630 00
T. F. Madden	Boatman	3 00 per day	555 00		555 00
David Morris	Boatman	3 00 per day	522 00		522 00
C. E. McCarthy	Boatman	3 00 per day	360 00		360 00
W. P. Nolan	Boatman	3 00 per day	126 00		126 00
W. K. Smith	Boatman	3 00 per day	393 00		393 00
W. H. Turnbull	Boatman	3 00 per day	408 00		408 00
Wm. Wolf	Boatman	3 00 per day	382 00		382 00
Edward Baylis	Laborer	2 00 per day	84 00		84 00
W. J. Biggart	Laborer	2 00 per day	266 00		266 00
Wm. Bird	Laborer	2 00 per day	438 00		438 00
F. A. Boltwood	Laborer	2 00 per day	644 00		644 00
G. H. Brewster	Laborer	2 00 per day	108 00		108 00
John Butler	Laborer	2 00 per day	220 00		220 00
F. A. Button	Laborer	2 00 per day	12 00		12 00
Joseph Case	Laborer	2 00 per day	186 00		186 00
Chas. Chant	Laborer	2 00 per day	306 00		306 00
W. C. Clark	Laborer	2 00 per day	54 00		54 00
H. L. Crouse	Laborer	2 00 per day	17 00		17 00
Thos. Dalton	Laborer	2 00 per day	350 00		350 00
H. R. Davidson	Laborer	2 00 per day	260 00		260 00
Isaac Davis	Laborer	2 00 per day	350 00		350 00
R. A. Donaldson	Laborer	2 00 per day	312 00		312 00
M ichael Dooley	Laborer	2 00 per day	396 00		396 00
M. Dorsch	Laborer	2 00 per day	144 00		144 00
Thos. Dunn	Laborer	2 00 per day	20 00		20 00
Wm. Fader	Laborer	2 00 per day	132 00		132 00
Chas. Farley	Laborer	2 00 per day	38 00		38 00
Leo Fitzgerald	Laborer	2 00 per day	122 00		122 00
W. M. Francis	Laborer	2 00 per day	16 00		16 00
J. T. Garvin	Laborer	2 00 per day	284 00		284 00
Wm. Gass	Laborer	2 00 per day	14 00		14 00
R. E. Hardy	Laborer	2 00 per day	108 00		108 00
J. C. Hayes	Laborer	2 00 per day	314 00		314 00
O. A. Jacobs	Laborer	2 00 per day	158 00		158 00
T. A. Keane	Laborer	2 00 per day	412 00		412 00
Nathan Lasdon	Laborer	2 00 per day	314 00		314 00
John Lavery	Laborer	2 00 per day	730 00		730 00
J. E. Linter	Laborer	2 00 per day	3 00		3 00
Edward Lower	Laborer	2 00 per day	2 00		2 00
Edgar Lynd	Laborer	2 00 per day	432 00		432 00
Daniel Malone	Laborer	2 00 per day	138 00		138 00
E. F. McCleary	Laborer	2 00 per day	194 00		194 00
M. McConnell	Laborer	2 00 per day	656 00		656 00
A. McDougall	Laborer	2 00 per day	204 00	$98 00	302 00
John McGraw	Laborer	2 00 per day	192 00		192 00
Michael McMahon	Laborer	2 00 per day	270 00		270 00
J. C. McShane	Laborer	2 00 per day	62 00		62 00
J. F. Mitchell	Laborer	2 00 per day	20 00		20 00
M. J. O'Brien	Laborer	2 00 per day	398 00		398 00
Leonard Paige	Laborer	2 00 per day	634 00		634 00
F. G. Smith	Laborer	2 00 per day	12 00		12 00
Joseph Smith	Laborer	2 00 per day	30 00		30 00
Jas Spain	Laborer	2 00 per day	146 00		146 00
V. R. Tremper	Laborer	2 00 per day	128 00		128 00
George Trombley	Laborer	2 00 per day	618 00		618 00
R. Wemple, Jr	Laborer	2 00 per day	110 00		110 00
P. B. White	Laborer	2 00 per day	374 00		374 00
A. J. Banker	Axeman and office assistant	2 25 per day	146 25		146 25
E. L. Bennett	Axeman and office assistant	2 50 per day	116 50		116 50
E. B. Hollenbeck	Axeman and office assistant	2 50 per day	699 50		699 50
J. P. Hughes	Axeman and office assistant	2 00 per day	252 00		252 00
John McEntee, Jr	Axeman and office assistant	2 00 per day	52 00		52 00
Chas. Watson	Axeman and office assistant	2 00 per day	108 00		108 00
G. J. Abel	Gage reader	7 00 per month	49 00		49 00
Godfrey Aman	Gage reader	7 00 per month	84 00		84 00
C. V. Barrett	Gage reader	5 00 per month	60 00		60 00
John Burns	Gage reader	7 00 per month	14 00		14 00
Wm. Butler	Gage reader	7 00 per month	28 00		28 00
Frank Fayant, Sr	Gage reader	7 00 per month	42 00		42 00
John Fernald	Gage reader	5 00 per month	60 00		60 00
C. H. Fitch	Gage reader	7 00 per month	84 00		84 00
G. W. Flansburg	Gage reader	7 00 per month	56 00		56 00

Construction of Barge Canal — Erie Canal — (Concluded).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
John Grau	Gage reader	$5 00 per month	$5 00		$5 00
Edward Hagerty	Gage reader	7 00 per month	56 00		56 00
J. D. Hambrecht	Gage reader	7 00 per month	42 00		42 00
C. H. Hanson	Gage reader	7 00 per month	35 00		35 00
H. M. Hoag	Gage reader	5 00 per month	30 00		30 00
Herbert Hockle	Gage reader	10 00 per month	55 00		55 00
Roy Hubbard	Gage reader	7 00 per month	28 00		28 00
Lloyd Kast	Gage reader	5 00 per month	60 00		60 00
J. J. Lyons	Gage reader	5 00 per month	30 00		30 00
Frank McArthur	Gage reader	7 00 per month	84 00		84 00
J. B. Mackey	Gage reader	7 00 per month	49 00		49 00
R. S. Marshall	Gage reader	7 00 per month	28 00		28 00
James Murphy	Gage reader	7 00 per month	56 00		56 00
A. W. Nelson	Gage reader	7 00 per month	28 00		28 00
P. C. Pickard	Gage reader	7 00 per month	56 00		56 00
J. Reepmeyer, Jr.	Gage reader	10 00 per month	120 00		120 00
E. P. Ryan	Gage reader	7 00 per month	35 00		35 00
John Schmelts	Gage reader	3 00 per month	12 00		12 00
A. M. Spencer	Gage reader	7 00 per month	63 00		63 00
John Stark	Gage reader	7 00 per month	56 00		56 00
Wm. C. Vrooman	Gage reader	7 00 per month	56 00		56 00
Raymond Waterbury	Gage reader	7 00 per month	63 00		63 00
M. E. Wheeler	Gage reader	7 00 per month	84 00		84 00
W. J. Wick	Gage reader	5 00 per month	40 00		40 00
Robert Wilson	Gage reader	6 00 per month	72 00		72 00
C. W. Young	Gage reader	14 00 per month	140 00		140 00
W. E. Young	Gage reader	7 00 per month	56 00		56 00
			$172,144 48	$7,878 68	$180,023 16
Incidental Expenses.					
Instruments, tools and appliances				$140 18	
Office rent				1,854 51	
Fuel and light				601 42	
Stationery and printing				159 53	
Postage				196 42	
Telephone and telegraph				1,180 38	
Miscellaneous				7,760 93	
					11,893.37
Total					$191,916 53

Construction of Barge Canal — Champlain Canal.

Chapter 147, Laws of 1903, and amendatory laws.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Geo. D. Williams	Division engineer	$4,200 per year		$2 75	$2 75
J. A. O'Connor	Division engineer	4,200 per year	$500 00	271 52	771 52
D. B. LaDu	Resident engineer	3,000 per year	2,725 00	1,507 62	4,232 62
E. V. R. Payne	Resident engineer	2,700 per year	2,700 00	737 42	3,437 42
F. N. Sanders	Resident engineer	3,000 per year	88 71	6 90	95 61
F. P. Williams	Resident engineer	3,000 per year	2,959 68	326 60	3,286 28
H. E. Brainard	Bridge designer	175 per month	903 79	89 47	993 26
Hugh Reilly	Cashier	150 per month	20 00		20 00
Parkes D. Wendell	Estimate clerk	200 per month	1,100 00	12 86	1,112 86
Chas. B. Dunham, Jr.	Clerk	125 per month	337 50		337 50
Arthur Rosenchild	Clerk	75 per month	409 36		409 36
G. W. Ruso	Clerk	112 50 per month	56 25		56 25
Hattie A. Dell	Stenographer	100 per month	200 00		200 00
Georgina Pflaum	Stenographer	75 per month	662 50		662 50

Construction of Barge Canal — Champlain Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
J. E. Phinney	Stenographer	$83 33 per month	$983 30		$983 30
L. I. Benjamin	Temporary stenographer	2 50 per day	162 50		162 50
H. L. Clarke	Engineering draftsman	4 00 per day	1,260 00		1,260 00
D. E. Damon	Engineering draftsman	5 00 per day	1,570 00		1,570 00
J. E. Hall	Engineering draftsman	5 00 per day	1,645 00		1,645 00
F. B. Holmes	Engineering draftsman	5 00 per day	1,620 00		1,620 00
J. L. Southworth	Engineering draftsman	5 00 per day	705 00		705 00
R. W. Scott	Tracer	75 per month	900 00		900 00
I. L. Stalker	Tracer	75 per month	900 00		900 00
S. W. Belding	Assistant engineer	6 00 per day	2,004 00	$328 63	2,332 63
W. C. Benedict	Assistant engineer	6 00 per day	2,112 00	382 12	2,494 12
W. L. Caler	Assistant engineer	5 50 per day	1,758 00		1,758 00
F. S. Crowell	Assistant engineer	6 00 per day	2,028 00	146 30	2,174 30
C. A. Curtis	Assistant engineer	6 00 per day	2,106 00	233 03	2,339 03
R. G. Finch	Assistant engineer	6 00 per day	150 00	1 20	151 20
R. D. Hayes	Assistant engineer	6 00 per day	2,064 00	191 05	2,255 05
H. W. Hale	Assistant engineer	6 00 per day	2,034 00	278 53	2,312 53
L. T. Howard	Assistant engineer	6 00 per day	2,124 00	404 46	2,528 46
F. C. Koerner	Assistant engineer	6 00 per day	2,010 00	475 19	2,485 19
J. B. Maguire	Assistant engineer	6 00 per day	36 00		36 00
C. L. McClelland	Assistant engineer	6 00 per day	114 00		114 00
A. C. Richards	Assistant engineer	6 00 per day	2,112 00	63 70	2,175 70
B. W. Rosekrans	Assistant engineer	6 00 per day	1,914 00		1,914 00
W. B. Watson	Assistant engineer	6 00 per day	2,034 00	548 57	2,582 57
E. W. Wendell	Assistant engineer	6 00 per day	1,720 00	423 70	2,143 70
W. C. Bratton	Leveler	4 50 per day	1,125 00		1,125 00
F. J. Doerhoefer	Leveler	4 50 per day	1,442 00		1,442 00
Jas. B. Foote	Leveler	5 00 per day	1,580 00		1,580 00
E y Gamse	Leveler	4 50 per day	27 00		27 00
R. G. Gibson	Leveler	5 00 per day	1,650 00	3 40	1,653 40
F. B. Hall	Leveler	4 50 per day	1,521 50		1,521 50
W. T. Hunt	Leveler	5 00 per day	1,755 00		1,755 00
B. F. Kenyon	Leveler	5 00 per day	1,675 00		1,675 00
John McBride	Leveler	5 00 per day	1,580 00		1,580 00
A. R. Morse	Leveler	5 00 per day	1,580 00	140 45	1,720 45
L. S. Rickard	Leveler	5 00 per day	1,600 00		1,600 00
J. A. Wallace	Leveler	4 50 per day	211 50		211 50
Bernard Wich	Leveler	5 00 per day	190 00		190 00
W. D. Zielley	Leveler	4 50 per day	1,210 00		1,210 00
J. L. Ames	Rodman	3 50 per day	7 00		7 00
R. W. Anderson	Rodman	3 50 per day	434 00		434 00
A. Bloom	Rodman	3 50 per day	203 00		203 00
W. M. Bronk	Rodman	3 50 per day	597 00		597 00
C. M. Colony	Rodman	4 00 per day	308 00		308 00
Geo. Deutschbein	Rodman	3 50 per day	437 50		437 50
L. Greenalch	Rodman	4 00 per day	518 00		518 00
R. Jerrell	Rodman	3 50 per day	736 50		736 50
F. M. Kuchar	Rodman	3 50 per day	427 00		427 00
Mott Palmer	Rodman	4 00 per day	1,339 00		1,339 00
H. J. Richardson	Rodman	4 00 per day	792 00	185 61	977 61
G. M. Rodgers	Rodman	3 50 per day	451 50		451 50
F. Schramm	Rodman	3 50 per day	640 50		640 50
J. E. Cotter	Chainman	3 00 per day	859 00		859 00
E F. Dossert	Chainman	3 00 per day	949 50		949 50
H. F. Eagan	Chainman	3 00 per day	366 00		366 00
H. L. Edelson	Chainman	2 50 per day	45 00		45 00
C. H. Farnam	Chainman	2 50 per day	302 50		302 50
Byron Houghtaling	Chainman	2 50 per day	464 50		464 50
J. P. Kivlen	Chainman	2 50 per day	815 00		815 00
H. S. Miller	Chainman	3 00 per day	1,023 00		1,023 00
D. O'Connell	Chainman	2 50 per day	322 50		322 50
L. C. Pope	Chainman	2 50 per day	52 50		52 50
J. J. Raup	Chainman	3 00 per day	903 00		903 00
G. A. Rogers	Chainman	2 50 per day	756 50		756 50
J. Scharf	Chainman	2 50 per day	117 50		117 50
G. L. Stillman	Chainman	2 50 per day	75 00		75 00
F. B. Stoddard	Chainman	3 00 per day	1,041 00		1,041 00
J. B. Sullivan	Chainman	3 00 per day	381 50		381 50
H. J. Weir	Chainman	2 50 per day	815 50		815 50
T. B. Bowes	Foreman of borings	4 00 per day	348 00		348 00
L. W. Donnelly	Inspector of masonry	5 00 per day	1,705 00		1,705 00
F. B. Kraft	Inspector of masonry	5 00 per day	1,580 00		1,580 00

Construction of Barge Canal — Champlain Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
F. G. Tilton	Inspector of masonry	$5 00 per day	$1,260 00		$1,260 00
A. M. Wait	Inspector of public works	5 00 per day	40 00	$35 67	75 67
Fred Betts	Laborer	2 00 per day	278 00		278 00
Robert Bowe	Laborer	2 00 per day	256 00		256 00
P. H. Bradley	Laborer	2 00 per day	302 00		302 00
Thomas M. Brennock	Laborer	2 00 per day	122 00		122 00
G. H. Brewster	Laborer	2 00 per day	106 00		106 00
Harold T. Canfield	Laborer	2 00 per day	100 00		100 00
Timothy Clancy	Laborer	2 00 per day	272 00		272 00
Wm. C. Clark	Laborer	2 00 per day	52 00		52 00
D. H. Craw	Laborer	2 00 per day	274 00		274 00
Daniel Cronin	Laborer	2 00 per day	86 00		86 00
T. J. Dailey	Laborer	2 00 per day	438 00		438 00
Daniel Dwyer	Laborer	2 00 per day	256 00		256 00
C. Farley	Laborer	2 00 per day	280 00		280 00
J. J. Finn	Laborer	2 00 per day	712 00		712 00
Cornelius Fitzgerald	Laborer	2 00 per day	350 00		350 00
Michael Goldschmidt	Laborer	2 00 per day	206 00		206 00
T. E. Hickey	Laborer	2 00 per day	244 00		244 00
E. W. Hiser	Laborer	2 00 per day	92 00		92 00
Wm. Hoy	Laborer	2 00 per day	168 00		168 00
L. Kaufman	Laborer	2 00 per day	142 00		142 00
J. C. Kelso	Laborer	2 00 per day	376 00		376 00
Harry LaFrance	Laborer	2 00 per day	306 00		306 00
George LaJoy	Laborer	2 00 per day	294 00		294 00
J. F. Landrigan	Laborer	2 00 per day	150 00		150 00
Wm. Maloney	Laborer	2 00 per day	158 00		158 00
James Mansfield	Laborer	2 00 per day	210 00		210 00
George Mayhew	Laborer	2 00 per day	240 00		240 00
J. F. Mitchell	Laborer	2 00 per day	60 00		60 00
Patrick Murphy	Laborer	2 00 per day	266 00		266 00
A. McDougall	Laborer	2 00 per day	102 00	38 96	140 96
N. H. McHerd	Laborer	2 00 per day	268 00		268 00
H. H. McMasters	Laborer	2 00 per day	572 00		572 00
H. J. McShalley	Laborer	2 00 per day	226 00		226 00
Fred Nehill	Laborer	2 00 per day	228 00		228 00
John Noonan	Laborer	2 00 per day	320 00		320 00
Hugh O'Connor	Laborer	2 00 per day	46 00		46 00
John Rock	Laborer	2 00 per day	718 00		718 00
J. F. Ryan	Laborer	2 00 per day	346 00		346 00
Edward Shanahan	Laborer	2 00 per day	178 00		178 00
E. W. Smith	Laborer	2 00 per day	252 00		252 00
T. B. Smith	Laborer	2 00 per day	110 00		110 00
H. G. Streeter	Laborer	2 00 per day	104 00		104 00
R. Sweeney	Laborer	2 00 per day	240 00		240 00
J. Vaughn	Laborer	2 00 per day	266 00		266 00
Edward Wendell	Laborer	2 00 per day	402 00		402 00
O. H. Whittenhall	Laborer	2 00 per day	154 00	83 00	237 00
Fred Williams	Laborer	2 00 per day	668 00		668 00
W. M. Francis	Axeman and office assistant	2 50 per day	649 00		649 00
L. R. Hellner	Axeman and office assistant	2 00 per day	642 00		642 00
C. B. McMasters	Axeman and office assistant	2 00 per day	662 00		662 00
Thomas Ryan, Jr	Axeman and office assistant	2 50 per day	733 00		733 00
E. L. Casey	Boatman	3 00 per day	180 00		180 00
J. H. Conniff	Boatman	3 00 per day	552 00		552 00
F. H. Craig	Boatman	3 00 per day	399 00		399 00
J. H. Dolan	Boatman	3 00 per day	912 00		912 00
J. Fox	Boatman	3 00 per day	489 00		489 00
Edward Harrigan	Boatman	3 00 per day	384 00		384 00
J. P. King	Boatman	3 00 per day	360 00		360 00
J. F. Mitchell	Boatman	3 00 per day	228 00		228 00
L. A. Smith	Boatman	3 00 per day	171 00		171 00
Wm. K. Smith	Boatman	3 00 per day	624 00		624 00
Wm. Wolf	Boatman	3 00 per day	573 00		573 00
P. J. Whalen	Boatman	3 00 per day	618 00		618 00
E. H. Bowker	Gage reader	7 00 per month	56 00		56 00
L. C. Brazier	Gage reader	12 00 per month	144 00		144 00
F. E. Chapman	Gage reader	8 00 per month	75 00		75 00
S. L. Cluett	Gage reader	7 00 per month	56 00		56 00
J. H. Donnelly	Gage reader	7 00 per month	84 00		84 00
Wm. E. Downing	Gage reader	7 00 per month	84 00		84 00
Wm. B. Dunstan	Gage reader	7 00 per month	84 00		84 00

Construction of Barge Canal — Champlain Canal — (Concluded).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Edward Durkin	Gage reader	$7 00 per month	$21 00		$21 00
A. B. Fisher	Gage reader	7 00 per month	56 00		56 00
H. C. Funston	Gage reader	7 00 per month	63 00		63 00
P. F. Gleason	Gage reader	7 00 per month	28 00		28 00
George Hammond	Gage reader	7 00 per month	56 00		56 00
E. G. Hayner	Gage reader	8 00 per month	69 68		69 68
Karl Herzog, Jr	Gage reader	5 00 per month	60 00		60 00
T. E. Hickey	Gage reader	8 00 per month	8 00		8 00
Benjamin Metcalf	Gage reader	7 00 per month	42 00		42 00
Albion Morton	Gage reader	7 00 per month	28 00		28 00
T. B. Sanders	Gage reader	7 00 per month	42 00		42 00
W. H. Sigsworth	Gage reader	7 00 per month	28 00		28 00
James Steen	Gage reader	7 00 per month	28 00		28 00
Benjamin Thebo	Gage reader	7 00 per month	84 00		84 00
H. C. Tinker	Gage reader	7 00 per month	84 00		84 00
			$108,441 77	$6,918 71	$115,360 48
Incidental Expenses.					
Instruments, tools and appliances				$148 34	
Office rent				896 00	
Fuel and light				334 53	
Stationery and printing				133 25	
Postage				169 45	
Telegraph and telephone				594 56	
Miscellaneous				4,447 94	
					6,724 07
Total					$122,084 55

Bureau of Bridges.

Chapter 513, Laws of 1910; Chapter 811, Laws of 1911.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Wm. R. Davis	Chief bridge designer	$375 per month	$653 57		$653 57
H. D. Miller	Bridge designer	175 per month	51 19		51 19
J. C. Podmore	Bridge designer	150 per month	35 00		35 00
C. H. Wood	Bridge designer	175 per month	79 03		79 03
F. E. Blake	Mechanical engineer	175 per month	17 50		17 50
J. A. Jensen	Mechanical draftsman	100 per month	10 00		10 00
J. L. Southworth	Engineering draftsman	5 00 per day	25 00		25 00
Total			$871 29		$871 29

Examination of Monuments and Maps.

Chapter 513, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
A. T. O'Leary	Assistant engineer	$6 00 per day	$684 00	$881 23	$1,565 23
H. J. Stabile	Rodman	4 00 per day	152 00	184 75	336 75
H. F. Eagan	Chainman	3 00 per day	213 00		213 00
J. Harrington	Laborer	2 00 per day	116 00		116 00
L. A. Hequembourg	Laborer	2 00 per day	86 00		86 00
H. M. McConnell	Laborer	2 00 per day	26 00		26 00
Henry McIntyre	Laborer	2 00 per day	146 00		146 00
D. C. Schilling	Laborer	2 00 per day	22 00		22 00
K. M. Boutelle	Axeman and office assistant	2 00 per day	28 00		28 00
			$1,473 00	$1,065 98	$2,538 98
Incidental Expenses.					
Livery				$432 75	
Postage				4 50	
Telephone and telegraph				45	
Miscellaneous				148 08	
					585 78
Total					$3,124 76

Surveys for State Board of Claims.

Chapter 433, Laws of 1909.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
J. A. O'Connor	Division engineer	$4,200 per year		$22 10	$22 10
C. D. Burrus	Engineering draftsman	6 00 per day	$12 00	15 17	27 17
J. B. Maguire	Assistant engineer	6 00 per day	84 00	10 95	94 95
H. V. Button	Rodman	3 50 per day	7 00		7 00
Frank Roberts	Rodman	4 00 per day	72 00	81 97	153 97
			$175 00	$130 19	$305 19
Incidental Expenses.					
Miscellaneous				$0 30	
					30
Total					$305 49

Mapping Canal Lands.

Chapter 199, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
C. D. Burrus	Engineering draftsman	$6 00 per day	$78 00		$78 00
Edwin Hilborn	Assistant engineer	6 00 per day	1,878 00	$384 52	2,262 52
S. E. Brettheimer	Leveler	4 50 per day	1,116 00		1,116 00
W. J. Bissell	Rodman	3 50 per day	973 00		973 00
L. A. Hequembourg	Rodman	3 50 per day	738 00		738 00
C. H. Hurley	Rodman	4 00 per day	16 00		16 00
George Terwilliger	Chainman	3 00 per day	835 00		835 00
R. E. Leonard	Laborer	2 00 per day	24 00		24 00
Arnold Hooper	Laborer	2 00 per day	110 00		110 00
M. Mahoney	Laborer	2 00 per day	24 00		24 00
C. E. Larkin	Axeman and office assistant	2 50 per day	632 50		632 50
			$6,424 50	$384 52	$6,809 02
Incidental Expenses.					
Stationery and printing				$1 98	
Postage				1 40	
Miscellaneous				143 98	
					147 36
Total					$6,956 38

Improvement of Mohawk River and West Canada Creek.

Chapter 132, Laws of 1911.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
J. T. Gorman	Clerk	$112 50 per month	$47 78		$47 78
R. G. Finch	Assistant engineer	6 00 per day	372 00	$301 61	673 61
J. B. Maguire	Assistant engineer	6 00 per day	84 00	68 56	152 56
H. V. Button	Rodman	3 50 per day	45 50		45 50
N. B. Epstein	Rodman	3 50 per day	42 00		42 00
E. H. Leggett	Rodman	3 50 per day	21 00		21 00
Frank Roberts	Rodman	4 00 per day	256 00		256 00
John Edelstein	Chainman	2 50 per day	12 50		12 50
Wm. Ginsberg	Chainman	3 00 per day	141 00		141 00
N. B. Robbins	Chainman	3 00 per day	27 00		27 00
J. J. Taney	Chainman	2 50 per day	12 50		12 50
B. Z. Wildenberg	Chainman	2 50 per day	12 50		12 50
J. L. Daly	Laborer	2 00 per day	50 00		50 00
J. M. Fogarty	Laborer	2 00 per day	24 00		24 00
A. McDougall	Laborer	2 00 per day	52 00		52 00
R. M. Perry	Laborer	2 00 per day	12 00		12 00
C. B. Davis	Boatman	3 00 per day	81 00		81 00
			$1,292 78	$370 17	$1,662 95
Incidental Expenses.					
Miscellaneous				$27 51	
					27 51
Total					$1,690 46

Minisceongo Bridge Pier.

Chapter 513, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
R. G. Finch	Assistant engineer	$6 00 per day	$42 00	$55 04	$97 04
Henry J. O'Hara	Rodman	3 50 per day	231 00		231 00
J. F. Mitchell	Boatman	3 00 per day	12 00	22 48	34 48
Total			$285 00	$77 52	$362 52

Topographic Survey.

Chapter 513, Laws of 1910; Chapter 811, Laws of 1911.

In Coöperation with United States Geological Survey.

D. H. Baldwin	$242 50
Joseph Boushear	235 00
P. A. Chamberlin	102 00
Melvin Company	136 00
C. E. Cooke	861 12
F. W. Crisp	104 25
G. C. Curtis	130 50
J. A. Daniels	77 67
George Farney	181 50
Jerry Filkins	112 00
Peter Flavin	104 50
J. I. Gayetty	376 52
S. A. Graham	65 00
E. E. Harris	102 00
R. H. Harrison	182 00
H. E. Hawkinson	125 33
E. F. Henderson	127 00
J. A. Jepson	67 00
A. J. Kavanaugh	182 00
R. J. Kelly	57 75
J. H. Lee Feaver	235 30
A. J. Magra	30 00
Harvey Malcolm	249 50
Howard Mellinger	129 83
J. B. Metcalfe, Jr	186 93
John Mills	6 00
Lamont Monnat	30 00
W. H. S. Morey	195 00
D. C. McGregor	38 00
R. C. McKinney	224 33
H. H. Otto	168 00
Pepin & Mouso	86 00
J. M. Perkins	132 00
Clarence Powers	95 00
James Rayburn	166 50
K. E. Schlachter	355 00
H. S. Senseney	226 00
F. L. Shalibo	182 00
E. O. Swedberg	89 25
Olinus Smith	212 67
D. M. Sullivan	72 00
B. F. St. Louis	44 00
J. M. Whitman, Jr	914 65
J. B. Zehr	101 50
Total	$7,741 10

Hydrographic Survey.

Chapter 513, Laws of 1910; Chapter 811, Laws of 1911.

In Coöperation with United States Geological Survey.

Lester Allen	$60 00
G. E. Carman	60 51
W. E. Coe	48 00
Edward Conron	1 50
C. C. Covert	107 27
C. S. DeGolyer	105 45
Percy Howe	43 17
W. G. Hoyt	58 82
W. A. James	201 92
D. L. Orcutt	45 20
C. S. Rolles	35 87
Mrs. Russell Vashti	48 60
Lester Sevarie	36 00
F. J. Shuttleworth	4 38
H. L. Smith	30 00
Jewett Snyder	7 20
Frank Weber	74 04
Frank Zock	11 83
Total	$979 76

SUMMARY.

The foregoing tables are summarized as follows:

Ordinary Repairs to Canals.

1. Erie canal, chapter 512, Laws of 1910	$8,001 28
2. Champlain canal, chapter 512, Laws of 1910	3,998 72

Construction of Barge Canal.

3. Head office account, chapter 147, Laws of 1903; chapter 67, Laws of 1911	265,815 87
4. Erie canal, chapter 147, Laws of 1903; chapter 67, Laws of 1911	191,916 53
5. Champlain canal, chapter 147, Laws of 1903; chapter 67, Laws of 1911	122,084 55

Bureau of Bridges.

6. Bureau of bridges, chapter 513, Laws of 1910; chapter 811, Laws of 1911	871 29

Special Surveys.

7. Examination of monuments and maps, chapter 513, Laws of 1910	3,124 76
8. Surveys for State Board of Claims, chapter 433, Laws of 1909	305 49
9. Mapping canal lands, chapter 199, Laws of 1910	6,956 38
10. Improvement of Mohawk river and West Canada creek, chapter 132, Laws of 1911	1,690 46
11. Minisceongo bridge pier, chapter 513, Laws of 1910	362 52
12. Topographic survey, chapter 513, Laws of 1910; chapter 811, Laws of 1911	7,741 10
13. Hydrographic survey, chapter 513, Laws of 1910; chapter 811, Laws of 1911	979 76
Total	$613,848 71

TABLE OF CONTRACTS COMPLETED ON THE EASTERN DIVISION DURING THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Final payment.
Kelley Bros. Contracting Co	Dec. 28, 1906	Contract No. 18, Erie canal — Mindenville to Castle creek	$785,980 00	$611,382 39	$476,978 85
Penn Bridge Co	April 19, 1909	Contract No. 32, Champlain canal — Lock gates, etc., on contracts Nos. 3, 25 and 27	59,820 00	46,797 00	44,375 31

TABLE OF CONTRACTS PENDING ON THE EASTERN DIVISION, SEPTEMBER 30, 1911.

Special Work.

CONTRACTOR.	Date of contract.	Character of work.	Act.		Appropriation.	Engineer's preliminary estimate.	Contract price.	Payments to September 30, 1911.
			Chap.	Year.				
E. S. Sickles	April 28, 1911	Reconstruction of the center pier (protection pier) of the draw bridge over Minisceongo creek, Rockland county	513	1910	$5,000 00	$4,461 00	$4,485 00	$ 0

TABLE OF CONTRACTS PENDING ON THE EASTERN DIVISION, SEPTEMBER 30, 1911 —(*Concluded*).

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work done to Sept. 30, 1911.
Empire Engineering Corporation	April 18, 1905	Contract No. 1, Champlain canal — Hudson river, Northumberland to Fort Miller and Crocker's Reef to Fort Edward	$619,846 00	$580,423 57	$474,400 00
Ferguson Contracting Co	April 3, 1905	Contract No. 2, Erie canal — Through Waterford to contract No. 11	1,022,640 00	955,118 01	694,390 00
*Holler & Shepard	Dec. 8, 1909	Contract No. 2-E, Erie canal — Through Waterford to contract No. 11	263,189 40	271,656 48	228,670 00
Sundstrom & Stratton	April 4, 1905	Contract No. 3, Champlain canal—Fort Miller to Crocker's Reef	760,576 00	657,273 09	633,290 00
Pittsburg-Eastern Co	May 22, 1906	Contract No. 8, Erie canal — Dams and locks at Scotia, Rotterdam and Cranesville	1,518,382 00	1,516,788 98	920,420 00
Fort Orange Construction Co	May 21, 1906	Contract No. 11, Erie canal — From contract No. 2 to Mohawk river	1,671,385 00	1,352,834 60	1,130,370 00
Penn Bridge Co	Nov. 7, 1908	Contract No. 13, Erie canal — Bridges on contract No. 18	12,303 50	10,170 20	9,930 00
Acme Engineering and Contracting Co	Sept. 10, 1907	Contract No. 14, Erie canal — Mohawk river, Crescent to Rexford Flats aqueduct; dams at Crescent and Mindenville; dams and locks at Vischer's Ferry, Canajoharie, Yosts and Fort Plain	2,875,570 00	2,975,792 72	2,347,350 00
Atlantic, Gulf & Pacific Co	Aug. 9, 1906	Contract No. 15, Champlain canal — Whitehall to Comstock	1,380,760 00	1,481,791 75	1,317,060 00
United Construction Co	Dec. 20, 1906	Contract No. 16, Erie and Champlain canals — Bridges on contracts Nos. 11, 25 and 27	70,719 00	78,715 15	5,380 00
The Scofield Co	Dec. 29, 1906	Contract No. 17, Erie canal — Dams and locks at Amsterdam and Tribes Hill	883,926 00	842,417 68	57,560 00
*Alexander Murdoch	Mar. 3, 1908		836,220 76	812,286 46	738,980 00
Houston Barnard	Aug. 20, 1909	Contract No. 20-A, Erie canal—Little Falls to Castle creek	499,000 00	490,592 50	119,430 00
S. Pearson & Son, Inc	Aug. 2, 1909	Contract No. 20-B, Erie canal — Mohawk river, Mindenville to Canajoharie	848,540 00	933,194 00	161,210 00
American Pipe and Construction Co.	Aug. 18, 1909	Contract No. 20-C, Erie canal — Mohawk river, Canajoharie to Yosts	570,600 00	585,720 00	324,260 00
American Pipe and Construction Co.	Aug. 18, 1909	Contract No. 20-D, Erie canal — Mohawk river, Yosts to Rexford Flats	2,260,000 00	2,685,477 40	62,740 00
Atlantic, Gulf and Pacific Co	Nov. 19, 1906	Contract No. 25, Champlain canal — Comstock to Dunhams Basin	1,849,831 00	1,694,037 00	1,410,290 00

Kinser Construction Co	Nov. 23, 1906	Contract No. 27, Champlain canal — Dunhams Basin to Fort Edward	998,920 00	723,268 61	378,650 00
*Holler & Shepard	Dec. 1, 1910	Contract No. 27-A, Champlain canal — Dunhams Basin to Fort Edward	409,455 00	450,181 80	73,250 00
Maryland Dredging and Contracting Co	April 3, 1909	Contract No. 29, Erie canal — Sterling creek to Herkimer-Oneida county line	812,350 00	674,249 66	333,650 00
Acme Engineering and Contracting Co	July 16, 1909	Contract No. 30, Erie canal — Mohawk river, Little Falls to Sterling creek	2,650,500 00	2,482,006 88	907,370 00
Casey & Murray	Sept. 2, 1908	Contract No. 31, Erie canal — Through Little Falls, Rocky Rift dam	813,800 00	834,927 78	662,960 00
Penn Bridge Co	Jan. 7, 1910	Contract No. 33, Erie and Champlain canals — Lock-gates, etc., on contracts Nos. 2, 11 and 15	137,155 36	149,252 81	133,890 00
J. D. Miller	May 3, 1910	Contract No. 36, Erie canal — Operating winches for movable dams in Mohawk river	72,000 00	46,800 00	5,850 00
The Hunkin-Conkey Construction Co	Dec. 13, 1909	Contract No. 54, Champlain canal — Lock No. 7 at Fort Edward	232,908 00	250,590 10	56,850 00
Shanley-Morrissey, Inc	Nov. 23, 1908	Contract No. 68, Champlain canal — Locks at Mechanicville, Stillwater and Northumberland	1,175,623 00	1,042,735 60	920,420 00
I. A. Hodge & Co., Inc	Dec. 11, 1909	Contract No. 69, Champlain canal — Lock at lower Mechanicville	270,675 00	240,061 00	156,330 00
Shanley-Morrissey, Inc	Jan. 11, 1910	Contract No. 70, Champlain canal — Hudson river, Waterford to lock No. 1	749,300 00	779,636 50	216,770 00
Shanley-Morrissey, Inc	Jan. 11, 1910	Contract No. 71, Champlain canal — Hudson river, lock No. 1 to lower Mechanicville	1,502,100 00	1,561,119 00	646,780 00
Shanley-Morrissey, Inc	Dec. 14, 1909	Contract No. 72, Champlain canal — Hudson river, lower Mechanicville to Stillwater	1,439,733 00	1,202,658 00	509,640 00
E. M. Graves	May 26, 1910	Contract No. 73, Champlain canal — Hudson river, Stillwater to Northumberland	778,960 00	771,627 00	416,990 00
Lathrop, Shea & Henwood Co	Sept. 23, 1911	Contract No. 86, Erie canal — Reconstruction of a portion of the bridge at Canajoharie	41,871 00	43,440 00	0
D'Olier Engineering Co	April 12, 1910	Contract No. 90, Champlain canal — Power-supply and operating equipment at Smiths Basin, Comstock and Whitehall locks	94,093 65	92,311 53	48,790 00
The Hollington Co	Jan. 5, 1911	Contract No. 91, Erie canal — Hydro-electric power-plant at Crescent dam	44,600 00	42,940 50	1,740 00

* Contract relet.

REPORT

OF THE

DIVISION ENGINEER

OF THE

MIDDLE DIVISION

For the Fiscal Year Ended September 30, 1911

MIDDLE DIVISION.

STATE OF NEW YORK,

DEPARTMENT OF STATE ENGINEER AND SURVEYOR,

MIDDLE DIVISION.

SYRACUSE, N. Y., *October* 2, 1911.

Hon. JOHN A. BENSEL, *State Engineer and Surveyor, Albany, N. Y.:*

Sir.— I have the honor to submit herewith my annual report as Division Engineer of the Middle Division, New York State Canals, for the fiscal year ended September 30, 1911.

Navigation on the Erie, Oswego, and Cayuga and Seneca canals has been uninterrupted throughout the season. On the Black River canal there have been three breaks which necessitated the closing of the canal for a total period of about five weeks. On June 3 the embankment put in to replace the old railroad aqueduct just above lock No. 13 failed. The repairs were completed and navigation resumed June 15. On July 7 the tow-path wall of lock No. 42 caved in, stopping navigation until July 19. July 26 all four gates of lock No. 13 were destroyed by a loaded boat. New gates were set and navigation resumed August 2.

SPECIAL LEGISLATION.

CONSTRUCTING A LIFT BRIDGE OVER THE ERIE CANAL AT SENECA STREET, UTICA.

(Chapter 454, Laws of 1909.)

Contractor, N. D. Peters.

Engineer in charge, L. D. Brownell.

Engineer's estimate	$19,000 00
Contractor's bid	15,992 75
Final account, rendered December 1, 1910	18,596 47

CONSTRUCTING A NEW BRIDGE OVER THE ERIE CANAL AT SOUTH WASHINGTON STREET, ROME.

(Chapter 522, Laws of 1910.)

Contractor, Henry Tosh & Son.

Engineer in charge, R. K. Sheldon.

Engineer's estimate	$15,486 00
Contractor's bid	14,777 50
Final account, rendered October 6, 1911	14,738 32

CONSTRUCTION OF A LIFT BRIDGE OVER THE ERIE CANAL AT FRANKLIN STREET, SYRACUSE.

(Chapter 453, Laws of 1909; Chapter 527, Laws of 1910.)

Engineer in charge, L. D. Brownell.

Engineer's estimate	$43,131 75
Contractor's bid	38,245 75
Work done to date	15,040 00

This work was let to the Steel Storage and Elevator Construction Company of Buffalo, and later assigned to Charles B. Foster.

IMPROVEMENT OF WEIGH LOCK BUILDING, SYRACUSE.

(Chapter 524, Laws of 1910.)

Under this act the sum of $15,000 was appropriated for providing fire-proof vaults for State records and improving the building in such a manner as to render it as fire-proof as possible without rebuilding it. Plans and specifications were gotten out last year. These have been revised this year and the work is about ready to advertise.

BOARD OF CLAIMS.

In addition to the usual requirements of the Superintendent of Public Works, in connection with ordinary repairs, considerable work has been done making surveys and maps of private properties alleged to have been damaged by the State, and putting the data in proper form for court use.

BLACK RIVER SURVEY.

(Chapter 190, Laws of 1911.)

This act provides for a survey, plans and estimate of cost, for a canal from Carthage to Sackett's Harbor.



BARGE CANAL, CONTRACT NO. 55.

A view from below the nearly completed dam at Delta reservoir, showing in the foreground a portion of the flight of locks of the relocated Black River canal, while just beyond is the discharge pool below the pipes in the dam.

Mau

The work was started August 1, 1911, with Louis A. Burns, of Watertown, N. Y., in charge. A base line has been run and bench levels established between the two points, which are about thirty miles apart. The taking of topography, borings, etc., was started at Sackett's Harbor and has progressed as far as Watertown — about twelve miles.

A report of the work done is appended to my report.

BLUE LINE SURVEY.

(Chapter 199. Laws of 1910.)

An act to provide for the mapping of certain canal lands and the lands adjacent thereto belonging to the State.

The work on the Middle Division was placed under Assistant Engineer E. C. Olcott and has been practically completed between Baldwinsville and Phoenix on the Oswego canal. Mr. Olcott reports to the Albany office, but the expense of the work is paid from the office of the Middle Division.

BARGE CANAL.

The Middle Division of the Barge canal extends from the east line of Oneida county to the south line of Wayne county, a distance of, including Oneida and Cross lakes, 107.4 miles. It also includes the Oswego branch extending from Three Rivers to Oswego — about twenty-five miles; the Cayuga and Seneca branch extending from Montezuma aqueduct to the foot of Seneca lake at Geneva, about twenty-two miles; and the territory covered by the Delta and Hinckley reservoirs in Oneida and Herkimer counties.

The main line, or Barge Erie, is divided into four sections, *viz.:* 4-A, 5, 6 and 7.

Residency 4-A extends from Oneida county line to Oriskany road, a distance of 8.96 miles, and comprises contract No. 42. It was in charge of Resident Engineer S. M. Savage with headquarters at Utica, until February 1, 1911, when he resigned. He was succeeded by Earle Talbot.

Residency No. 5 comprises contracts Nos. 43, 44 and 4. It was in charge of Edwin Styring until January 1, 1911. Since January 1, 1911, it has been in charge of Daniel B. Donovan, with headquarters at Rome.

The Water-Supply Residency comprises contracts Nos. 50, 51 and 55, and the highways adjacent to Delta reservoir. It has been in charge of Resident Engineer L. C. Hulburd, with headquarters at Rome.

Residencies Nos. 6 and 7 have been in charge of Resident Engineer D. C. Wedgeworth, with headquarters at Syracuse. These residencies comprise contracts Nos. 12, 22, 46 and part of 90.

Residency No. 2, Oswego, was in charge of Resident Engineer T. M. Ripley, with headquarters at Fulton, N. Y., until December 1, 1910, when the work was divided and Mr. James Burden given charge as Resident Engineer of the work from Fulton to Oswego, with headquarters at Oswego.

The Cayuga and Seneca Barge canal was in charge of Resident Engineer James Burden with headquarters at Albany, until December 1, 1911. He was succeeded by Mr. L. S. Hulburd, as Resident Engineer, with headquarters at Seneca Falls. May 1, 1911, the work was divided and the western portion placed under Resident Engineer A. E. Steere.

IN CONCLUSION.

The reports of the several Resident Engineers on the division, which follow, will give in detail the work accomplished on the Barge canal contracts, and following these reports will be found the name, rank and assignment of all employees of the division. Tables showing the condition of the Barge canal contracts are appended.

In concluding I desire to commend to you for efficient and faithful service the entire force of the division, and particularly the engineers and inspectors on the construction work on whose faithful service we depend for the integrity of the construction.

To you and Mr. Kastl I desire to express respect and loyalty for the consideration and help that you have given our efforts to carry on the affairs of the division for the past year.

Very respectfully,

EDWIN STYRING,
Division Engineer.

APPENDED REPORTS.

Resident Engineers' Reports on Barge Canal Construction.

ERIE CANAL, RESIDENCY No. 4-A.

Resident Engineer Earle Talbot reports:

Contract No. 42.

This contract extends from the Oneida-Herkimer county line to Oriskany road, a distance of 8.96 miles. Shanley-Morrissey, Incorporated, contractors.

Mr. Charles R. Chase is the Assistant Engineer in charge of the engineering on this contract, having succeeded Mr. W. A. Lafler in December, 1910. Work was begun by Shanley-Morrissey, Incorporated, in the latter part of July, 1909.

The operations of the contractors during the past year have been limited to that portion of the contract lying east of Carey road.

Three highway bridges, including concrete approach slabs, have been erected, and of these the Whitesboro-Marcy road bridge has been thrown open to highway traffic. The abutments and approaches of Park avenue bridge, Utica, are complete and the steel superstructure due on the ground.

There are two dive culverts on the contract and for these the sheeting and bracing have been placed and 75 per cent of the excavation completed. Foundation piles are being driven under the culvert site at Sta. 5346 + 49.

The stream entrances at Real's creek and at Schuyler street are nearly complete.

Sheet piling has been driven at various structures and a large amount has been driven under the embankment site, on both banks of the canal, at the east end of the contract.

Excavation from the prism has been chiefly in completing the south half of the canal section, and trimming slopes, by three large Page bucket revolving excavators, which have also formed embankment, as called for. Some material has been rehandled by these machines.

A 12-inch suction dredge has been completing the prism excavation from the lower approach of lock No. 20 to Whitesboro–Marcy road. Excavation of the lock site by the dredge was not undertaken.

At lock No. 20 the contractors have excavated with a large swing derrick, operating a Page bucket, a 70-ton Bucyrus steam-shovel and some smaller buckets. The east half of the lock site is excavated practically to grade and foundation piles are being driven for the east, or lower approach walls. The contractors have plant and materials at hand for progressing this work. Pumps are operating steadily, unwatering the lock site.

The percentage of work done on this contract for the past year has not exceeded that of the first season and the total percentage of work done is below the normal progress expected. However, a great deal of necessary preparatory work has been completed and numerous structures will be rapidly progressed in consequence.

The following table shows the percentage of work done during the past year and the total amount of work done to date upon the various contract items:

ITEMS OF WORK.	Preliminary estimate.	Preliminary estimate, including alterations Nos. 1, 2, 3, 4, 5, and 6.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	28	28	0	14.52	0	51.8
Grubbing.....cu. yds.	37,400	37,120	3,170	27,483	8.5	74.0
Excavation.....cu. yds.	2,786,300	2,735,290	734,797	1,803,283	26.9	65.9
Sheeting and bracing....ft. B. M.	250,000	279,100	55,830	55,830	20.0	20.0
Forming embankment....cu. yds.	646,800	643,100	28,265	276,656	4.4	43.9
Lining.....cu. yds.	3,500	3,536	242	242	6.8	6.8
Sawed lumber.....ft. B. M.	8,500	8,500	6,090	6,090	71.7	71.7
Foundation piles, 12–30 ft. long, lin. ft.	106,300	115,320	16,609	18,908	14.4	16.4
Wooden sheet-piling....ft. B. M.	194,000	774,000	419,660	443,090	54.2	57.2
Second-class concrete.....cu. yds.	34,550	34,894	1,569.8	1,737.2	4.5	5.0
Reinforced concrete.....cu. yds.	2,160	2,264	212.1	292.1	9.4	12.9
First-class masonry bridge coping, cu. yds.	15	15.7	3.26	3.26	20.8	20.8
Structural steel.....lbs.	1,236,000	1,320,000	312,102	312,102	23.5	23.5
Metal reinforcement.....lbs.	217,000	265,900	30,244	30,244	11.4	11.4
Wooden pavement.....sq. yds.	810	810	791.4	791.4	97.7	97.7
Maintaining highway traffic, lump sum	$2,000	$2,000	12.5%	12.5%	12.5	12.5

Total of all work done during year = 17.4 per cent.
Total of all work done to date = 36.5 per cent.

ERIE CANAL, RESIDENCY No. 5.

Resident Engineer D. B. Donovan reports:

Residency No. 5 extends from just east of the Oriskany road on the east to the Oneida-Oswego county line on the west, and contains contracts Nos. 43, 44, 4 and 4-B.



BARGE CANAL, CONTRACT No. 44.

View at lock No. 21, showing the driving of steel piling, within which to build the side walls of the lock.



Contract No. 43.

This contract extends from the Oriskany road on the east to about 1,500 feet west of Mud creek, a distance of 10.32 miles. Owing to complications arising from the necessity of relocating the New York Central railroad, the Utica & Mohawk Valley trolley and the Ontario & Western railroad, the actual construction on this contract has been delayed until the present season. The erection of a central concrete plant at Rome was begun late in the fall of 1910, the construction of a 20-inch hydraulic dredge was completed about July 1, 1911, and the contractor also placed three drag-line excavators at work about this time. The contractors have also installed concrete plants at Nine-Mile creek and Oriskany road.

The hydraulic dredge has excavated 319,269 cu. yds. from Mill street easterly to the New York Central railroad and the material has been placed in the New York Central railroad enbankment between these same points.

The drag-line excavators have been used in constructing dikes, building railroad embankment and sloping the prism banks of the canal.

The abutments for river channel bridge at Oriskany road, Nine-Mile creek spillway and also the abutments for the Mill street bridge have been completed.

The following table shows the percentage of work done on each item of the contract, percentage done during the year, and the whole amount of work done to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	140	4.3	4.3	3	3.0
Excavation.....cu. yds.	5,017,500	343,372	343,372	6.8	6.8
Sheeting and bracing.....ft. B. M.	210,000	22,188	22,188	10.6	10.6
Foundation piles.....lin. ft.	49,700	11,915	11,915	24.0	24.0
Wooden sheet-piling.....ft. B. M.	354,000	100,440	100,440	28.4	28.4
Second-class concrete.....cu. yds.	19,050	2,657	2,657	13.9	13.9

Total of all work done during year = 6.5 per cent.
Total of all work done to date = 6.5 per cent.
Contract price = $1,335,998.
Cost of work to date = $86,960.
The preliminary estimate includes nothing of alterations Nos. 1, 2, 3, 4 and 6. No other work done than that given above.
Under alteration No. 1 the preliminary estimate is increased for excavation 3,420 cu. yds.; foundation piles, 11,634 lin. ft.; second-class concrete, 1,800 cu. yds.

Contract No. 44.

This contract extends from the end of contract No. 43 on the east, to the beginning of contract No. 4 (4.82 miles east of Oneida lake) on the west, a distance of 7.08 miles. On this contract the Erie canal at New London divides the excavation into two parts. East of the canal crossing, the contractors have had in operation three steam-shovels, one with narrow gage track outfit, one with standard gage and one with incline tipple. West of the canal they have employed two tower scrapers and a steam-shovel. At lock No. 21 three derricks and a McMyler crane have been in use for the excavation.

East of the Erie canal there have been removed 587,863 cu. yds. during the year and there remain 636,000 cu. yds. to be removed. West of the Erie canal, 271,653 cu. yds. have been removed and there remain about 900,000 cu. yds., including the locks and junction lock.

At Stony Brook road bridge the superstructure has been erected and traffic is now passing over it, a small amount of work only remaining to be done. On Stony Brook entrance and spillway no work has as yet been done, nor at the junction lock.

Superstructure and spillways have been completed at the New London road bridge, but the approaches to the bridge have not been made.

Spillway and dive culvert near Sta. 6550 have been practically completed with the exception of a small amount of paving and backfilling.

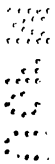
At lock No. 21 the lower south approach wall has been completed, the south wall 25 per cent and the north wall 23 per cent completed.

On spillway the ditch entrance at Sta. 6535 nothing has been done.

At lock No. 22 a considerable amount of excavation, wooden sheet-piling and round piling has been accomplished.



BARGE CANAL, CONTRACT No. 44.
View showing the formation of canal banks — tripple-lap sheet-piling and the spoil from excavation placed around it.



The following table shows the amounts and percentages of work done during the year and to date:

ITEMS OF WORK.	Preliminary estimate	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	100	93.2	96.3	93.2	96.3
Excavation.....cu. yds.	3,243,400	937,353	1,407,059	28.9	43.4
Sheeting and bracing.....ft. B. M.	300,000	308,300	316,678	100.0	100.0
Round timber bracing.....lin. ft.	45,000	7,557	7,557	16.8	16.8
First-quality steel piling.....sq. ft.	*55,000	53,877	55,056	98.0	100.0
Forming embankment.....cu. yds.	172,000	60,596	60,596	35.2	35.2
Lining.....cu. yds.	5,450	36	36	0.7	0.7
Puddle.....cu. yds.	800	61	61	0.8	0.8
Sawed lumber.....ft. B. M.	7,400	3,978	3,978	53.7	53.7
Foundation piles.....lin. ft.	204,800	19,338	29,738	9.4	14.5
Mooring piles.....lin. ft.	770	135	135	17.5	17.5
Wooden sheet-piling.....ft. B. M.	1,360,000	891,817	891,817	65.5	65.5
Second-class concrete.....cu. yds.	89,860	18,741	19,269	20.8	21.4
Reinforced concrete.....cu. yds.	550	270	431	49.0	78.3
Second-class stone paving.....sq. yds.	3,460	165	165	4.8	4.8
Structural steel.....lbs.	319,000	215,851	215,851	67.6	67.6
Metal reinforcement.....lbs.	113,000	39,701	56,914	35.1	50.3
Steel castings.....lbs.	44,000	3,102	3,102	7.0	7.0
Iron castings, plain.....lbs.	1,400	339	339	24.2	24.2
Iron castings, machined.....lbs.	67,000	21,757	21,757	32.5	32.5
Wooden pavement.....sq. yds.	700	527	527	75.3	75.3
Maintaining highway.....lump sum	$1,500	$300	$300	20.0	20.0
Coffer-dams, pumping, bailing and draining lump sum	$21,000	$5,670	$8,610	27.0	41.0

* An increase in first-quality steel piling from 30,000 sq. ft. to 55,000 sq. ft. was authorized by resolution of the Canal Board, dated October 25, 1910.

Total of all work done during year = 27.3 per cent of estimated cost.

Total of all work done to date = 33.6 per cent of estimated cost.

Contract price = $1,743,679.

Cost of work to date = $587,070.

Under alteration No. 3 the preliminary estimate is increased for excavation 800 cu. yds.; second-class concrete, 500 cu. yds.; and a decrease in foundation piles of 101,500 lin. ft. and 104,000 ft. B. M. wooden sheet-piling.

Contract No. 4.

This contract extends from the west end of contract No. 44 to deep water in Oneida lake and was practically completed somewhat over a year ago.

Contract No. 4-B.

This contract was for the construction of a culvert under the highway at Burdick's road near the eastern end of contract No. 4. The engineer's estimate for this structure was $1,553. This work was completed during the present season.

ERIE CANAL, RESIDENCY NO. 6.

Resident Engineer D. C. Wedgeworth reports:

Residency No. 6 extends from deep water in Oneida lake to Baldwinsville, a distance by the canal line of 23.4 miles. Con-

tracts Nos. 45, 57, and 101, and portions of Nos. 12, 13, 22 and 90 are within the limits of this residency.

Contract No. 12.

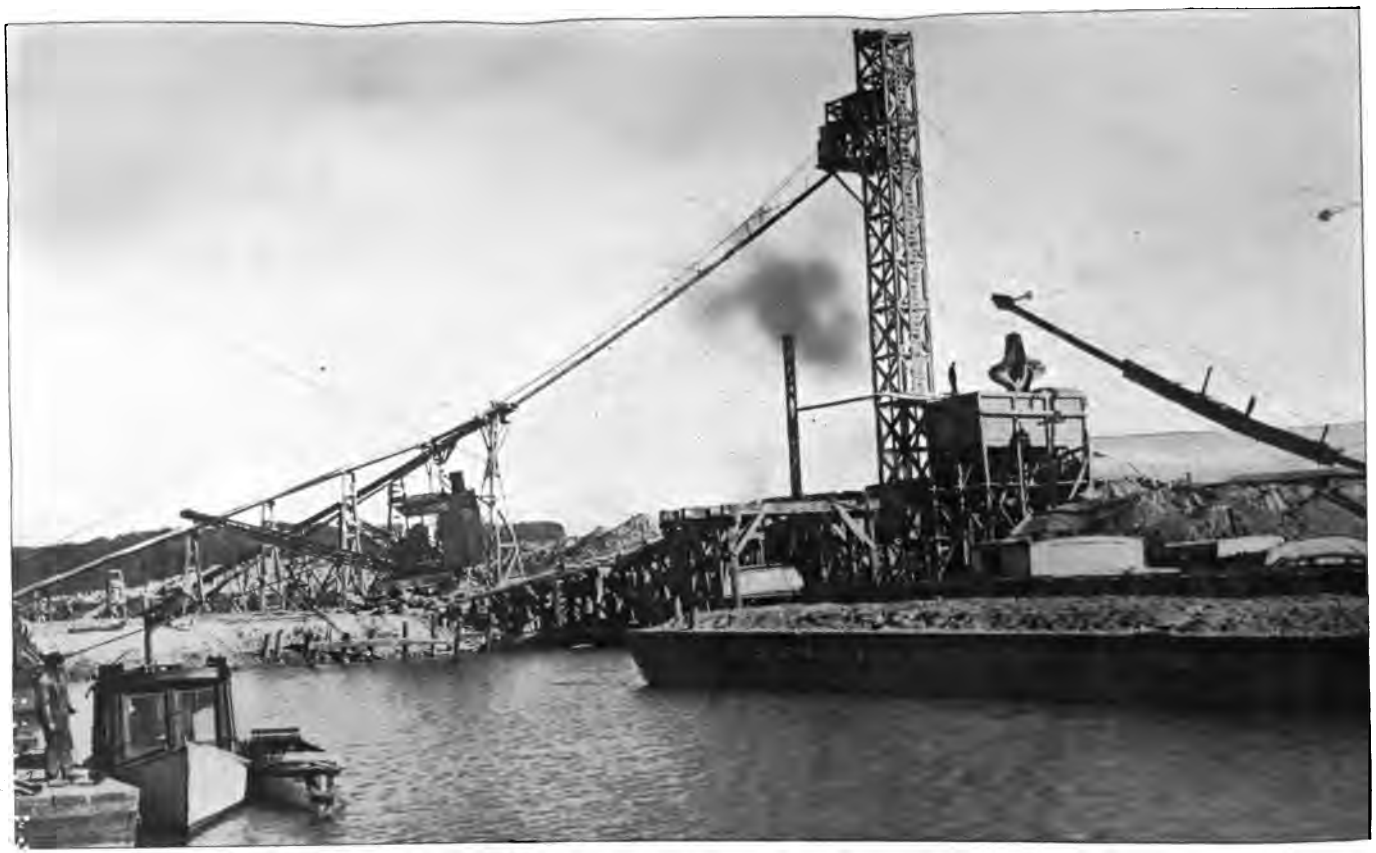
This contract was let to the Stewart-Kerbaugh-Shanley Co. of New York city on September 23, 1907. An assignment to James Stewart & Co. was approved by the State Engineer on August 25, 1910.

The total length of this contract is 43.75 miles, extending from deep water in Oneida lake to Mosquito Point bridge over the Seneca river. Of this distance 22.5 miles are in Residency No. 6 and the remainder in Residency No. 7.

The close of the year 1910 found hydraulic dredge No. 1 working in "Big Bend" cut-off, Sta. 3185 +, and dipper dredge No. 4 working in various places above Baldwinsville. The hydraulic dredge completed this cut in the fall and worked at Sta. 3371 until January 24, when the difficulties in keeping the river channel open were found too great and the dredge was taken to Baldwinsville for repairs. The dipper dredge continued work until December 15, when it was taken to Baldwinsville for repairs.

At the "Gaskins," Sta. 3357 +, a coffer-dam was built and a large section of the prism unwatered. A large number of steam and well drills was set up here and this section thoroughly drilled and blasted, after which the coffer-dams were removed. A drill boat has been at work outside of the section coffer-dammed at this point for nearly the entire season.

The results of the season's work for 1909 and 1910 seemed to indicate that the original plant for this work was not sufficient for handling the work with its great variety of material. The contractor moved headquarters to Baldwinsville and early in 1911 began the construction of three powerful dipper dredges. The construction of these machines was pushed with so much energy that they were ready for work, with the necessary dump scows, early in April. A glance at the accompanying record for the year will show that these dredges have been very efficient, despite the fact that it was necessary frequently to move and dismantle, in order to pass the several bridges along the contract. These dredges have been employed during the season between Three River Point, Sta. 3290, and Baldwinsville, on Residency No. 6, and between Bald-



BARGE CANAL, CONTRACT NO. 12.

View at lock No. 23, showing concrete tower and the chutes leading from it; also the boats delivering materials being unloaded. This lock is located in a land line which cuts off a large bend in the Oneida river. The boats are seen floating in the channel dredged to form this cut-off.

Page 1

winsville and State Ditch, Sta. 4450 on Residency No. 7. A large quantity of rock has been excavated and the hydraulic dredge has handled all material to which it was adapted. The principal cuts have been made at Stas. 4350, 4200, 4050, 3750, 3670 and 3350, and the " Y " at Three River Point.

After some time spent in clearing a channel, the hydraulic dredge and dipper dredge No. 5 arrived at the westerly end of the contract and commenced working at Stas. 4898 and 4859, respectively.

At the easterly end of the contract, lock No. 23, work was commenced in April. Some difficulty was experienced in building coffer-dams and beginning excavation. During the latter part of the season, however, a steam-shovel has been working as rapidly as possible, an efficient concrete mixing plant has been installed and the construction of the lock well begun.

The following table shows the amount of work done during the year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations Nos. 1, 3, 4, 6, 7 and 8.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$8,800	$1,179 20	$4,602 40	13.4	52.3
Grubbing.....cu. yds.	12,120	0	8,036	0	66.3
Excavation.....cu. yds.	7,700,200	1,354,870	4,264,295	17.6	55.4
Sheeting and bracing.....ft. B. M.	117,000	0	27,590	0	23.6
Forming embankment.....cu. yds.	131,400	24,604	50,506	18.7	38.4
Lining.....cu. yds.	1,330	0	490	0	37
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	538,900	0	36,500	0	6.8
Foundation piles, 12 ft. long.....No.	39	0	33	0	84.6
Foundation piles, 20 ft. long.....No.	180	0	71	0	39
Foundation piles, 25 ft. long*.....No.		0	16	0	
Foundation piles, 30 ft. long*.....No.		0	1	0	
Second-class concrete.....cu. yds.	31,196	2,828.72	3,873.72	9	12.4
Reinforced concrete†.....cu. yds.	§ 950	0	849	0	89.3
First-class masonry bridge coping.....cu. yds.	10	0	7.10	0	71
Wash wall.....cu. yds.	10,158	0	49.8	0	0.49
Cobblestone paving.....sq. yds.	120	0	30	0	25
Third-class riprap.....cu. yds.	970	0	110	0	11.3
Structural steel.....lbs.	657,360	1,023	557,137	0.15	84.7
Metal in lock-gates.....lbs.	200,000	1,601	1,601	0.8	0.8
Metal in needle-dams.....lbs.	80,000	320	320	0.4	0.4
Metal reinforcement.....lbs.	78,000	0	56,419	0	72.3
Iron castings, plain.....lbs.	31,600	113	113	0.36	0.36
Iron castings, machined.....lbs.	22,500	10,206	10,206	45.4	45.4
Raising bridge superstructure.....lump sum	$1,100	0	$1,100	0	100
Maintaining highway traffic.....lump sum	$6,600	$422 40	$3,524.40	6.4	53.4
Deductions.					
Bridge superstructures removed.....lump sum	$1,350	0	$1,350	0	100
Sheeting and bracing reused.....ft. B. M.	20,000	0	18,600	0	93
Gross estimate.....	$3,548,817 19	$890,700 99	$2,120,840 99	25	59

* Found necessary to use longer piles than called for in preliminary estimate.

† Changed from second-class concrete to reinforced concrete, by order of State Engineer.

§ NOTE.— Increase of 540 cubic yards of reinforced concrete authorized by resolution of Canal Board, May 26, 1908.

Contract No. 45.

This contract is for the construction of a dam at Caughdenoy and of lock No. 24 and appertaining structures at Baldwinsville, and is 0.55 mile in length. The contract was let to Scott Bros. May 6, 1908.

This contract was completed during 1910.

Contract No. 13.

The part of this contract on this residency is for the construction of steel highway superstructures at Stas. 2901 + 83, 2960 and 3185 + 48. This contract was let to the Penn Bridge Co., on Nov. 7, 1908.

The only work done this year has been that necessary to complete the structures at Stas. 2960 and 3185 + 48. The substructure at Sta. 2901 + 83 has not been constructed.

The following table shows the amount of work during the year:

ITEMS OF WORK.	Preliminary estimate as affected by alteration No. 1.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Structural steel.....lbs.	604,000	30,246	225,576	5.0	37.3
Sawed lumber, yellow pine.....ft. B. M.	14,130	4,771	4,771	33.8	33.8
Wooden pavement.....sq. yds.	1,628	618.4	618.4	38.0	38.0
Setting stone coping.....cu. yds.	10	.82	3.28	8.2	32.8
Gross estimate.....	$17,955 30	$2,920	$10,250	16.3	57.1

Contract No. 57.

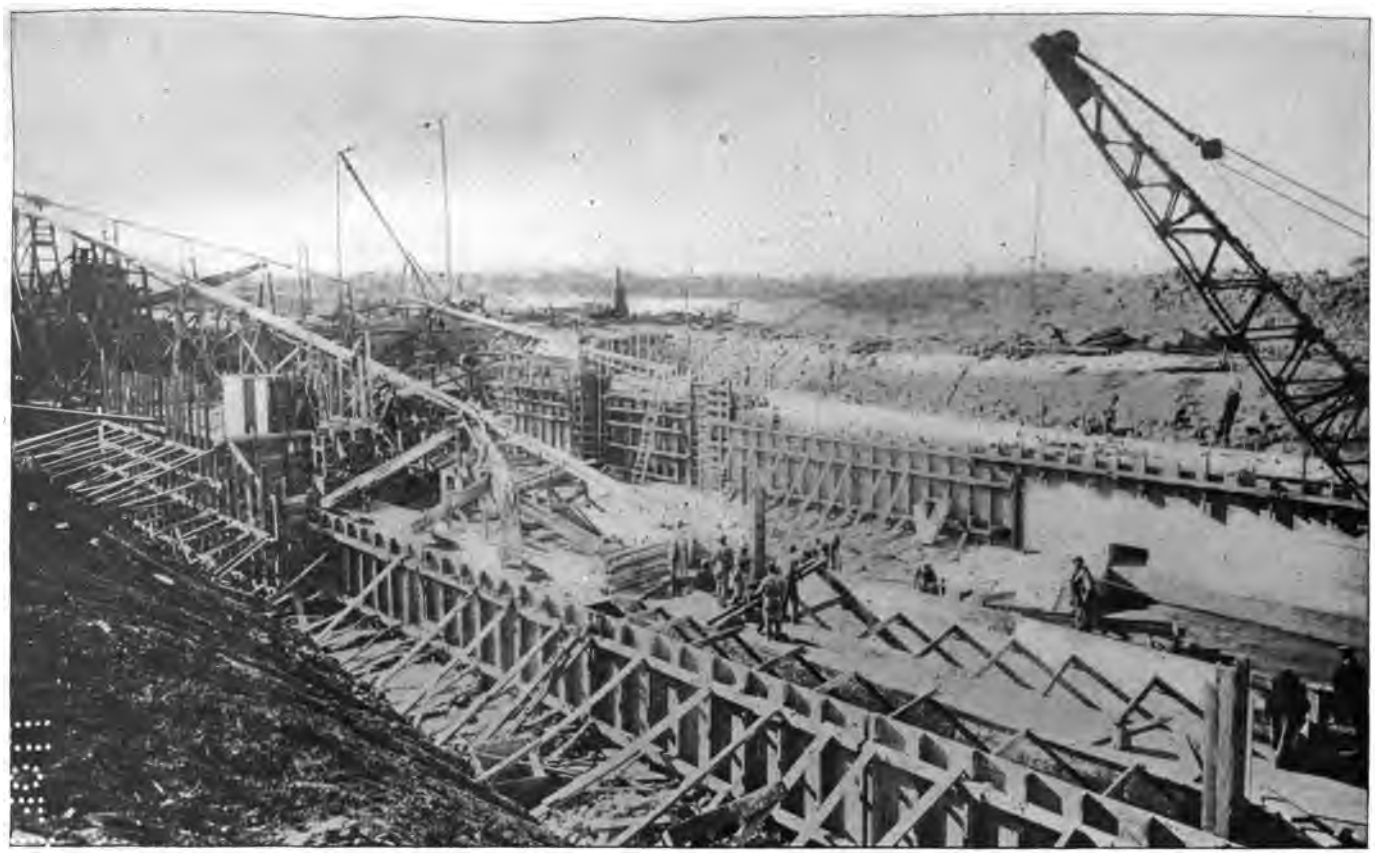
This contract is for the construction of a harbor at the south end of Onondaga lake, for the city of Syracuse. The preliminary work of making plans for this contract is completed and the plans are now in Albany, but are being held for further consideration.

Contract No. 101.

This contract is for the construction of a highway bridge over the Oneida river at Three River Point. Plans for this contract are nearly completed and it is expected that the contract will soon be let.

Contract No. 90.

The part of this contract on this residency is for furnishing and installing equipment for operating and lighting lock No. 24, Erie



BARGE CANAL, CONTRACT No, 12.
View at lock No. 23, showing concrete forms in place and chutes leading from the concrete tower.

canal, at Baldwinsville. This contract was let to the D'Olier Engineering Co., on April 6, 1910.

At this lock the power house has been built, turbines and generators installed, switch boards placed and nearly all connections made. The operating machinery is all in place, with exception of some motors, which have not arrived. All conduits and ducts are laid and lighting poles set up. The work at this lock is nearly ready for a test of its efficiency. The lock has been operated by hand during the entire season. The following table shows the amount of work done during the year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations Nos. 1, 2 and 3.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	127	1	*84	0.8	66.2
Chipping concrete.....cu. ft.	43	26	27	60.5	62.8
Forming embankment.....cu. yds.	104	6	60	5.8	57.7
Second-class concrete.....cu. yds.	26.1	1	16	3.8	61.7
First-class reinforced concrete.....cu. yds.	112	101	101	90.2	90.2
Structural steel.....lbs.	29,308	26,953	26,953	91.9	91.9
Metal reinforcement.....lbs.	6,650	5,444	6,190	81.8	93.1
Iron castings, plain.....lbs.	16,100	14,910	14,910	92.6	92.6
Metal ducts.....lbs.	3,502	3,664	3,664	104.6	104.6
Repaving gutters.....sq. yds.	130	109	109	83.8	83.8
Wrought iron pipe railing.....lin. ft.	34	32	32	94.1	94.1
Concrete conduit, single duct.....lin. ft.	2,390	1,800	2,275	75.3	95.2
Concrete conduit, double duct.....lin. ft.	537	534	534	99.4	99.4
Reinforced concrete conduit, double duct.....lin. ft.	40	39	39	97.5	97.5
Drilling 1¼-in. holes.....lin. ft.	39.5	39	39	98.7	98.7
Drilling 3-in. holes.....lin. ft.	123.5	97	97	78.5	78.5
3-in. fibre ducts.....lin. ft.	133	91	91	68.4	68.4
Lead covered insulated rubber conductors..lbs.	9,220	9,130	9,130	98.9	98.9
Generators with switch-board.....lump sum	$3,050	$3,050	$3,050	100	100
Governors.....No.	2	2	2	100	100
Head gates.....No.	2	2	2	100	100
Traveling crane.....No.	1	1	1	100	100
Electric capstans.....No.	2	2	2	100	100
Turbine machinery.....No.	2	1.96	1.96	98	98
Doors, window and woodwork.....lump sum	$175	$157 50	$157 50	90	90
Miscellaneous electrical equipment..lump sum	$4,445	$3,778 25	$3,778 25	85	85
Maintenance accessories.....lump sum	$30	$24	$24	80	80
Coffer-dams, etc.....lump sum	$100	$15	$15	15	15
Valve-operating machinery.....lbs.	15,500	6,520	6,520	42.1	42.1
Gate-operating machinery.....lbs.	24,875	11,879	11,879	47.7	47.7
Lamp poles.....No.	13	13	13	100	100
3-horse-power motors.....No.	4	1	1	25	25
7½-horse-power motors.....No.	4	1	1	25	25
Gross estimate.....	$30,619 59	$24,880	$25,310	81.3	82.6

* Decrease due to mistake in monthly estimate.

Contract No. 22.

This contract is for constructing new highway bridges over the Erie canal within the limits of contract No. 12. No work has been done on the portion of this contract in this residency.

ERIE CANAL, RESIDENCY No. 7.

Resident Engineer D. C. Wedgeworth reports:

Residency No. 7 extends from Baldwinsville to the Wayne county line, a distance of 32.7 miles by Barge canal line. The contracts on this residency are No. 46, the greater part of No. 22 and a part of No. 12, which has been described under Residency No. 6.

Contract No. 46.

This contract is for the construction of the Barge canal from Fox Ridge to the southeast corner of the town of Galen, a distance of 9.44 miles. Included in this contract are the bridge at Wayne county line and toll bridge at Montezuma, and the movable dam and lock No. 25 at May's Point.

Nearly all the substructure of the movable dam was completed during the winter and coffer-dams removed. Coffer-dams have been placed at the lock site and the site unwatered. Aside from this the work has been entirely hydraulic dredging.

The hydraulic dredge cut through the Erie canal at the westerly end of the Montezuma aqueduct early in the winter, immediately replacing the material up to the bottom of the canal. The banks were replaced before navigation opened in the spring. This dredge has excavated as far as the West Shore railroad crossing and is at present cleaning up the cut.

The following table shows the amount of work done on this contract during the year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations Nos. 1 and 2.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$5,000	$350	$2,700	7	54
Excavation.....cu. yds.	5,034,760	1,243,831	3,310,281	24.7	65.7
Sheeting and bracing.....ft. B. M.	61,500	22,722	22,722	36.9	36.9
Forming embankment.....cu. yds.	71,590	1,219	1,219	1.7	1.7
Foundation piles.....lin. ft.	163,550	16,680	20,388	10.2	12.4
Wooden sheet-piling.....ft. B. M.	405,030	112,641	151,433	27.8	37.4
Second-class concrete.....cu. yds.	31,326	3,131	3,131	10	10
Second-class riprap.....cu. yds.	3,844	1,004	1,004	26.1	26.1
Structural steel.....lbs.	575,722	296	296	0.05	0.05
Metal reinforcement.....lbs.	26,800	1,106	1,106	4.1	4.1
Bearing shoes.....No.	8	8	8	100	100
Coffer-dams, pumping, bailing and draining.....lump sum	$12,000	$3,600	$3,600	30	30
Removing bridge superstructure...lump sum	$200	$150	$150	75	75
Maintaining highway traffic.....lump sum	$1,500	$825	$825	55	55
Deductions.					
Reused sheeting and bracing.....ft. B. M.		1,620	1,620		
Bridges.....lump sum	$250	$150	$150	60	60
Gross estimate.....	$1,221,278 80	$249,450 00	$605,960	20.4	49.6



BARGE CANAL, CONTRACT No. 45.
View of the automatic dam at Baldwinsville, which is a section of the dam across the Seneca river.

Contract No. 22.

This contract is for constructing new highway bridges and raising existing highway bridges over the Erie canal between Cold Spring and Free bridges. This comprises raising Cold Spring, Jordan, Weedsport and Free Bridges, constructing the necessary new substructures and constructing new bridges over the State Ditch and Bonta's bridge. The contract was let to M. Fitzgerald on September 14, 1910.

During the winter the Free, Weedsport and Jordan bridges were raised and supported on blocking. The embankments, or approaches, to these bridges and also to Bonta's bridge have been nearly completed. A small abutment at the north end of Bonta's bridge and the footing for a pier have been constructed. The slab at the south end of Weedsport bridge and the supporting piers have been constructed. Excavation for the south abutment of Free bridge has begun.

The accompanying table shows the amount of work done during the year:

ITEMS OF WORK.	Preliminary estimate as affected by alteration No. 1.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	33,700	12,044	12,044	35.7	35.7
Forming embankment for bridge approaches.....cu. yds.	22,900	10,142	10,142	44.3	44.3
Foundation piles, 17-ft. to 20-ft.long..lin. ft.	14,650	520	520	3.5	3.5
Second-class concrete.....cu. yds.	4,060	239.1	239.1	5.9	5.9
Reinforced concrete.....cu. yds.	280	118.3	118.3	42.2	42.2
Third-class riprap.....cu. yds.	105	106	106	100.9	100.9
Metal reinforcement.....lbs.	32,400	10,896	10,896	33.6	33.6
Removing bridge superstructures..lump sum	$1,000	$80	$80	8	8
Maintaining highway traffic.....lump sum	$3,500	$735	$735	21	21
Raising bridge superstructures....lump sum	$3,500	$1,925	$1,925	55	55
Gross estimate.....	$117,194 50	$14,969 86	$14,969 86	12.8	12.8

OSWEGO CANAL, RESIDENCY NO. 1.

Resident Engineer T. M. Ripley reports:

The work on this residency consists of the following contracts: Contracts Nos. 10, 33, 39, 53, 78, 90 and Highway.

Contract No. 80. For constructing a dam, with Taintor gates, and bulkheads across the river at Phoenix.

Contract No. 85. For constructing a lift bridge over lock No. 1 at Phoenix.

Highways on Ox creek. For raising highways and highway bridges on Ox creek. This work is being designed.

The total amount of work done on this residency during the year is shown in the following tables:

Work under Contract October 1, 1910.

Contract No.	Value of work under contract.	Value of work done to October 1, 1910.
Contract No. 10	$1,111,964 57	$606,800 00
Contract No. 33	55,020 00	0 00
Contract No. 39	1,048,674 00	26,430 00
Contract No. 53	167,385 00	137,530 00
Contract No. 78	49,025 95	23,560 00
Contract No. 90	32,719 80	0 00
Highway	11,627 50	310 00
Total	$2,476,416 82	$794,630 00

Work under Contract prior to October 1, 1911.

Contract No.	Value of work under contract.	Value of work done to October 1, 1911.
Contract No. 10	$1,111,964 57	$668,360 00
Contract No. 33	55,020 00	24,890 00
Contract No. 39	1,048,674 00	130,600 00
Contract No. 53	167,385 00	164,759 27
Contract No. 78	49,025 95	46,360 00
Contract No. 80	117,390 64	53,030 00
Contract No. 85	13,238 50	500 00
Contract No. 90	32,719 80	15,950 00
Highway	11,627 50	11,090 00
Total	$2,607,045 96	$1,115,539 27

Amount of work put under contract during the fiscal year, $130,629.14. Amount of work done during year, $320,909.27. Percentage of all work on residency done to date, 42.4 per cent. All values based on contract prices.

Contract No. 10.

Held at end of year by the State of New York. George C. Andrews, Assistant Engineer, in charge.

For some months prior to the beginning of the fiscal year the receivers for the McDermott Contracting Co., appointed by a Fed-



BARGE CANAL, CONTRACT No. 90.
View of power house at lock No. 24, Baldwinsville.

Contract No. 33.

George C. Andrews, Assistant Engineer, in charge. Penn Bridge Co. of Beaver Falls, Pa., contractors. The work done consists of the placing and erection of the gates, valves and needle-beams for lock No. 2 and the finishing and framing of the needles for locks Nos. 2 and 3. Work was started in January, 1911.

The following table gives the summary of work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Sawed lumber, yellow pine or Douglas fir..ft. B. M.	2,647	1,416	1,416	54.4	54.4
White oak in lock-gates.....ft. B. M.	14,120	6,920	6,920	49.1	49.1
Sawed lumber in needles.....ft. B. M.	37,326	36,080	36,080	96.8	96.8
Metal reinforcement.....lbs.	240	87	87	36.2	36.2
Metal in lock-gates.....lbs.	515,200	225,378	225,378	43.7	43.7
Metal in needle-beams.....lbs.	132,200	73,925	73,925	55.8	55.8
Metal in lock-valves.....lbs.	72,000	33,626	33,626	46.7	46.7

Engineer's estimate, entire contract, $183,618.60.
Contract price, entire contract, $199,639.70.
Contract price, amount on this residency, $55,020.

Contract No. 39.

P. H. Budd, Leveler, in charge of contract. James Stewart & Co., New York city, contractors.

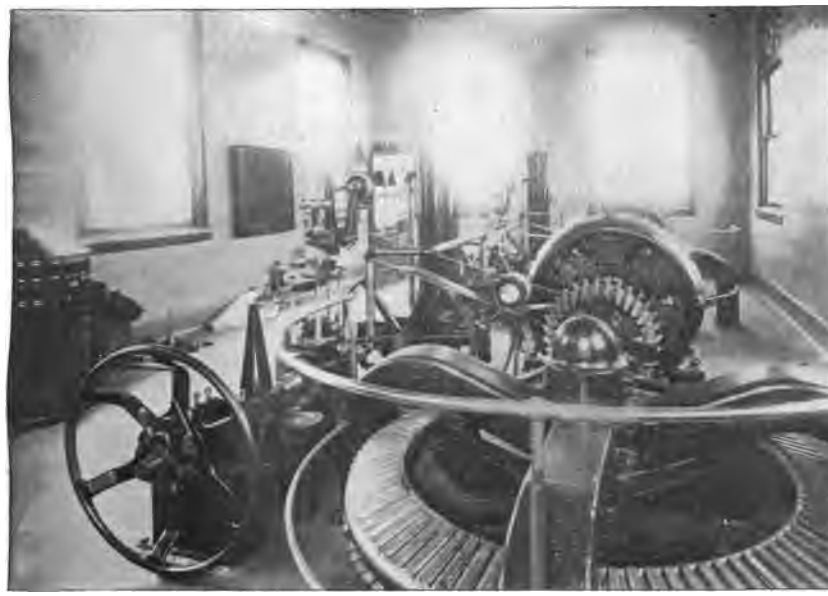
The steam-shovel which was working in the Hinmansville cut-off at the beginning of the year was nearly submerged during a rise in the river early in January. When the water subsided the shovel was removed and no further work was done at this point until August. Since then a small force with teams has been trimming the upper slopes. In July a suction dredge was put on the work near Three River Point. This was soon exchanged for a dipper dredge and in September a drill boat was put ahead of the dredge.

The following table gives the summary of work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$150	0	0	0	0
Excavation.....cu. yds.	1,226,000	125,509	157,353	10.25	12.88

Engineer's estimate, $972,900.
Contract price, $1,048,674.
Percentage of work done during year = 9.78.
Percentage of work done to date = 12.42.





BARGE CANAL, CONTRACT NO. 90.

Interior views of the power house at lock No. 24, Baldwinsville, showing two 50-kw., direct-current, 250-volt generators, connected through bevel gearing to 100-hp. water turbines. The governor shown is a type of Lombard governor made especially for Barge canal work. Overhead is a 3-ton traveling crane. The house is lighted with four 100-watt tungsten lamps.

Contract No. 53.

Louis A. Burns, Assistant Engineer, in charge. Scott Brothers, Lynchburg, Va., contractors.

Operations progressed steadily on this contract and the work was completed and the last monthly estimate rendered in February, 1911.

The following table gives the summary of work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.*	Total work done to date (final estimate).	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$10	$10	$10	100	100
Excavation.....cu. yds.	50,100	7,769	56,674	15.5	113.1
Sheeting and bracing.....ft. B. M.	121,000	3,791	10,911	3.1	9
Round timber bracing.....lin. ft.	510	0	586	0	115
Forming embankment.....cu. yds.	7,920	2,458	10,145	31	128
Sawed lumber, yellow pine or Douglas fir.....ft. B. M.	1,000	852	852	85.2	85.2
White oak lumber in miter-sills and gates.....ft. B. M.	8,000	5,552	6,692	69.4	83.6
Second-class concrete.....cu. yds.	15,700	597.1	15,333.1	3.8	97.7
Reinforced concrete.....cu. yds.	5	0.22	0.22	4.4	4.4
Fourth-class riprap.....cu. yds.	100	31	68	31	68
Structural steel.....lbs.	8,200	5,243	11,233	63.9	137
Metal reinforcement.....lbs.	8,000	10	8,010	0.1	100.1
Iron castings, plain.....lbs.	12,000	945	12,179	7.9	101.5
Iron castings, machined.....lbs.	7,000	0	6,360	0	90.8
Metal in lock-gates.....lbs.	218,000	192,591	204,418	88.3	93.7
Metal in buffer-beams.....lbs.	78,000	66,492	74,064	85.3	95.0
Metal in lock-valves.....lbs.	24,000	22,485	22,890	93.7	95.4
Drilling bolt holes in rock.....lin. ft.	500	0	324.4	0	64.8
Maintaining highway traffic.....lump sum	$250	$200	$250	80	100
Maintaining navigation.....lump sum	$250	0	0	0	0
Coffer-dams, pumping, bailing and draining.....lump sum	$3,000	$525	$3,000	17.5	100
Vitrified pipe and specials.....lin. ft.	500	0	428	0	85.6
Brick manholes.....No.	4	0	4	0	100
Excavation of concrete.....cu. ft.	26	0	15.41	0	59.3
Lowering bridge superstructure.....lump sum	$150	$150	$150	100	100

* These figures are the differences between the totals appearing in last year's report and the final estimate computations. They do not, therefore, in every instance represent the amount of work done during the year.

Engineer's estimate, $200,500.

Contractor's price, as affected by alterations Nos. 1 and 2, $167,585.

Final estimate, $164,575.52.

Percentage of work done during year = 16.25.

Contract No. 78.

Mark D. Ewell, Leveler, in charge of contract. Cunningham-Woodard Co., Hudson Falls, N. Y., contractors.

Work on this contract progressed slowly, and October and November, 1910, being very wet months, but little work was done, as the borrow pit was soft and the material difficult to handle in the cars and spread on the dike.

In December work stopped entirely, owing to frost, with the exception of the laying of wash wall. This latter work continued nearly all the winter and is in good condition now.

In June, 1911, work again started in the borrow pit and continued until September. The dike is completed, with the exception of a small amount of trimming and the seeding.

The following table gives the summary of work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	105,550	36,315	103,802	34.4	98.5
Forming embankment.....cu. yds.	91,430	32,207	89,458	35.2	97.9
Second-class concrete.....cu. yds.	44	0	40	0	91
Wash wall.....cu. yds.	6,230	5,201	5,330	83.6	85.6
24-inch vitrified pipe, laid.....lin. ft.	750	0	718	0	96
10-inch vitrified pipe, laid.....lin. ft.	50	40	40	80	80
Manhole covers and grating.....lbs.	700	96	696	13.7	99.5
Additional manhole, exclusive of cover,.....lump sum	$43	0	$43	0	100
Trenching and backfilling for 700 ft. of vitrified pipe.....lin. ft.	700	0	665	0	95

Engineer's estimate, $55,154.
Contractor's price, as affected by alterations Nos. 2 and 3, $47,721.50.
Percentage of work done during year = 46.6.
Percentage of work done to date = 94.5.

Contract No. 80.

Robert K. Sheldon, Assistant Engineer, in charge of contract. Walter Bradley, Fulton, N. Y., contractor.

This contract was let January 16, 1911. The first monthly estimate was rendered for July. Prior to the beginning of actual construction, a coffer-dam about 1,550 feet long was constructed so as to enclose about 80 per cent of the work, including all of the south bulkhead, the south dam, the Taintor gates and about one-half of the north dam. Aside from the delay caused by the slow delivery of steel and iron this work has progressed well. All concrete and excavation are finished inside this dam and the remainder of the site will be unwatered and work started in October, 1911.



BARGE CANAL, CONTRACT No. 80.

View of the Phœnix dam, showing the Taintor gates at the left and the western spillway at the right, while a portion of the eastern spillway is seen in the lower left corner of the view.



BARGE CANAL, CONTRACT No. 80.

View showing progress in erecting the steel work of the Taintor gates at the Phœnix dam.

The following table gives the summary of the work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	6,930	3,072	3,072	44.3	44.3
Forming embankment.....cu. yds.	300	0	0	0	0
Sawed lumber, yellow pine or Douglas fir.....ft. B. M.	5,000	1,080	1,080	21.6	21.6
Sawed lumber, white oak.....ft. B. M.	2,800	1,780	1,780	63.6	63.6
Second-class concrete.....cu. yds.	6,884	4,099	4,099	63.2	63.2
Metal reinforcement.....lbs.	24,100	5,933	5,933	24.6	24.6
Metal in head-gates.....lbs.	189,520	64,605	64,605	34.1	34.1
Metal in valves.....lbs.	4,920	2,591	2,591	52.7	52.7
Metal in Taintor gates.....lbs.	312,200	4,051	4,051	1.3	1.3
Gate-hoists, class "A".....No.	8	3	3	37.5	37.5
Gate-hoists, class "B".....No.	19	0	0	0	0
Removing old steel in bulkheads....lump sum	$100	$33 33	$33 33	33⅓	33⅓
Coffer-dams, pumping, bailing and draining,.....lump sum	$22,500	$14,850	$14,850	66	66

Engineer's estimate, $134,340.
Contractor's price, $117,390.64.
Percentage of work done during year = 45.
Percentage of work done to date = 45.

Contract No. 85.

Robert K. Sheldon, Assistant Engineer, in charge of contract. Lupfer & Remick, Buffalo, N. Y., contractors.

This contract is for a lift-bridge over lock No. 1 at Phoenix and was let August 5, 1911.

This bridge has a clear span of 45 feet and, when down, the ends rest upon the lock walls. In type it is a half through, plate girder, bascule. At one end a tower carries two balance beams, one over each girder; the outer ends of these beams carry a concrete counterweight; the inner ends are pin-connected to links, which in turn are pin-connected to the tops of the girders at about the center of the span.

Operation is provided through an operating spar, carrying a rack meshing into a spur gear at the top of the tower. Machinery is provided for either hand or electrical operation.

The following table gives the summary of work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	1,260	511	511	40.4	40.4
Forming embankment.....cu. yds.	630	12	12	1.9	1.9
Coffer-dams, pumping, bailing and draining,.....lump sum	$240	$96	$96	40	40

Engineer's estimate, $12,785.50.
Contractor's price, $13,238.50
Percentage of work done during year = 3.78.
Percentage of work done to date = 3.78.

Contract No. 90.

In charge of Assistant Engineers on the primary contracts affected. D'Olier Engineering Co., Philadelphia, Pa., contractors.

The work under this contract on this residency has progressed slowly, it being carried on in conjunction with similar work on Oswego canal Residency No. 2 (locks at Oswego) and Erie canal Residency No. 6 (lock at Baldwinsville).

Gate and valve-operating machinery has been set at lock No. 1 and lock No. 2 and wiring for same with controller cabinets and switch stands is nearly completed; also some ducts and wiring for light poles have been placed.

The following table gives the summary of work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	71	32	32	45	45
Chipping concrete.....cu. ft.	9	7	7	77.8	77.8
Forming embankment.....cu. yds.	62	19	19	30.6	30.6
Second-class concrete.....cu. yds.	14.4	10	10	69.4	69.4
Structural steel.....lbs.	46,900	46,351	46,351	98.7	98.7
Iron castings, plain.....lbs.	40,200	37,527	37,527	93.3	93.3
Metal ducts.....lbs.	13,894	10,749	10,749	77.6	77.6
Repaving gutters.....sq. yds.	20	0	0	0	0
Concrete conduit, single duct.....lin. ft.	900	863	863	96	96
Concrete conduit, double duct.....lin. ft.	867	592	592	68.3	68.3
Reinforced concrete conduit, double duct. lin. ft.	14	8	8	57.1	57.1
Drilling 1½-inch holes for ducts.....lin. ft.	46	63	63	136.8	136.8
Drilling 3-in. holes for ducts.....lin. ft.	171.5	143	143	83.3	83.3
3-in. fibre ducts.....lin. ft.	61	23	23	37.7	37.7
Lead-covered, rubber-insulated conductors. lbs.	17,440	5,657	5,657	32.4	32.4
Miscellaneous electrical equipment, lock No. 1.....lump sum	$3,435	$2,404	$2,404	70	70
Miscellaneous electrical equipment, lock No. 2.....lump sum	$4,200	$2,436	$2,436	58	58
Maintenance accessories.....lump sum	$60	0	0	0	0
Coffer-dams, pumping, bailing and draining.....lump sum	$25	0	0	0	0
Valve-operating machinery.....lbs.	34,500	20,913	20,913	60.6	60.6
Gate-operating machinery.....lbs.	49,750	17,217	17,217	34.6	34.6
Lamp poles.....No.	20	0	0	0	0
3-hp. motors.....No.	8	3	3	37.5	37.5
7½-hp. motors.....No.	8	0	0	0	0

Engineer's estimate, entire contract, $180,630.
Contractor's price, as affected by alterations Nos. 2 and 3, $180,317.94.
Contractor's price, on this residency, $32,719.80.
Percentage of work done during year = 48.8.
Percentage of work done to date = 48.8.
Percentage based on portion of contract chargeable to this residency.

Highway Contract.

The raising of about 3,300 linear feet of the river road south from the south end of the dike on contract No. 78 has progressed slowly. The material for this work was taken from the same borrow pit as used for contract No. 78 and reference is made to the report for that contract.



BARGE CANAL, CONTRACT No. 79.
Bridge street bridge, at Oswego. View beneath the south side.

The following table gives the summary of the work done:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	23,000	24,858	25,903	108	112.5
Forming embankment.....cu. yds.	21,000	23,506	24,109	112	114.6
Guard rail.....lin. ft.	4,000	0	0	0	0
Second-class concrete.....cu. yds.	186	133	133	71.5	71.5
Timber grillage.....ft. B. M.	10,000	12,466	12,466	124.6	124.6
2-inch pipe rail.....lin. ft.	23	23	23	100	100
Metal reinforcement.....lbs.	1,200	1,530	1,530	127.4	127.4
Clearing.....lump sum	$300	$300	$300	100	100
Wash wall.....cu. yds.	180	0	0	0	0

Contractor's price, $11,627.50.
Percentage of work done during year = 92.7.
Percentage of work done to date = 95.4.

OSWEGO CANAL, RESIDENCY NO. 2.

Resident Engineer James Burden reports:

This residency extends from the northern end of Fulton to Lake Ontario, a distance of 10.58 miles. Work is in progress on four contracts.

Contract No. 35.

This contract is for improving the Oswego canal between 0.56 of a mile above Utica street bridge and the harbor line north of Bridge street bridge, at Oswego, including the construction of locks Nos. 7 and 8, of 14.5 and 11.1 ft. lift, respectively, and other incidental work. Length of contract 0.85 of a mile. This contract was awarded to the Gilmour-Horton-Allen Co., September 16, 1907. The contract price, including alterations, is $722,501.67.

The following table shows the percentage of work done on the contract during the year, as well as the percentage of work done to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	189,417	31,017	103,908	16.4	54.8
Sheeting and bracing.....ft. B. M.	87,000	310	310	0.4	0.4
Embankment.....cu. yds.	9,910	1,084	2,574	11	25.9
Puddle.....cu. yds.	490	0	390	0	79.7
Sawed lumber, yellow pine or Douglas fir.....ft. B. M.	27,200	0	9,541	0	35
Sawed lumber, spruce.....ft. B. M.	1,500	0	693	0	46.2
White oak lumber in miter-sills and gates.....ft. B. M.	12,900	0	5,840	0	45.2
Sawed lumber, white oak.....ft. B. M.	41,000	0	15,637	0	38.4

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Second-class concrete.....cu. yds.	52,833	12,218	35,005	23.1	66.3
Reinforced concrete.....cu. yds.	1,551	260	1,428	16.7	92.1
Pointing old masonry.....lin. ft.	3,400	2,221	2,221	65.3	65.3
Fourth-class riprap.....cu. yds.	95	0	5	0	5.3
4-inch wrought iron pipe and specials.....lbs.	6,960	0	5,936	0	85.3
5-inch wrought iron pipe and specials.....lbs.	880	0	736	0	83.6
2-inch pipe valves.....No.	2	0	2	0	100
4-inch pipe valves.....No.	8	0	8	0	100
12-inch pipe valves.....No.	2	0	2	0	100
20-inch pipe valves.....No.	2	0	2	0	100
7-inch vacuum gages.....No.	4	0	4	0	100
Structural steel.....lbs.	364,400	8,212	249,822	2.3	68.5
Metal in lock-gates.....lbs.	406,000	4,166	181,427	1	44.7
Metal in needle-dams.....lbs.	85,000	2,300	42,981	2.7	50.6
Metal reinforcement.....lbs.	227,950	16,645	161,930	7.3	71.1
Iron castings, plain.....lbs.	51,400	8,485	24,266	16.5	47.2
Iron castings, machined.....lbs.	17,300	6,174	14,083	35.6	81.4
Wood block pavement.....sq. yds.	500	0	439	0	87.8
Fender fastenings.....No.	972	121	530	12.3	54.7
Expansion bolts in place.....No.	115	0	55	0	47.8
Scroll railing.....lin. ft.	440	0	396	0	90
Gate hoists, class "B".....No.	12	0	5	0	41.7
Gate hoists, class "E".....No.	5	1.8	1.8	36	36
Removing old bridge superstructures.lump sum	$100	0	$75	0	75
Raising buildings.....lump sum	$900	0	$900	0	100
Maintaining highway traffic.....lump sum	$500	$200	$250	40	50
Conduit, east of lock No. 8.....lump sum	$500	0	$400	0	80

Total of all work done during year = 18.6 per cent of estimated cost.
Total of all work done to date = 60.2 per cent of estimated cos .

Contract No. 90.

This contract is for furnishing and installing equipment for operating and lighting locks Nos. 7 and 8 on the Oswego canal and similar work on other residencies.

This contract was awarded to D'Olier Engineering Co., April 12, 1910.

The following table gives the summary of work done on this residency:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Structural steel.....lbs.	40,578	33,899	33,899	84	84
Metal ducts.....lbs.	17,401	5,781	5,843	33.2	33.6
Reinforced concrete.....cu. yds.	552	0	518	0	94
Drilling 1¼-inch holes.....lin. ft.	75	61	67	81.3	89.3
Drilling 3-inch holes.....lin. ft.	157	116	116	74	74
Lead-covered, rubber-insulated, conductors.lbs.	14,460	1,322	1,322	9.6	9.6
Miscellaneous electrical equipment, lock No. 8.....lump sum	$3,435	$1,290 57	$1,290 57	37.6	37.6
Miscellaneous electrical equipment, lock No. 7.....lump sum	$1,932	$504 95	$504 95	26.2	26.2
Valve-operating machinery.....lbs.	19,000	1,065	1,065	5.6	5.6
Gate-operating machinery.....lbs.	49,750	15,666	15,666	31.5	31.5
Lamp posts.....No.	18	6	6	33.3	33.3



BARGE CANAL, CONTRACT NO. 37.
A view of progress in excavating at the Battle Island cut-off.



Contract No. 79.

This contract is for constructing a highway bridge over the Oswego canal at Bridge street, Oswego. The contract was awarded to Lupfer & Remick, September 23, 1910. The contract price is $37,480.

The following table gives a summary of work done during the year and the total completed to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dams, pumping, bailing and draining.....lump sum	$1,800	$1,530	$1,530	85	85
Excavation.....cu. yds.	1,600	732	802	45.8	50.1
Second-class concrete.....cu. yds.	650	458	458	70.7	70.7
Structural steel.....lbs.	382,000	314,200	314,200	82.4	82.4
Metal reinforcement.....lbs.	49,000	2,686	2,686	5.5	5.5
Maintaining highway traffic.....lump sum	$800	$680	$680	85	85
Restoring old walls.....lump sum	$60	$48	$48	80	80

Total of all work done during year = 55.7 per cent of estimated cost.
Total of all work done to date = 55.9 per cent of estimated cost.

Contract No. 37.

This contract is for improving the Oswego canal between Fulton and Oswego, including the construction of locks Nos. 5 and 6 of 18 and 20 feet lift, respectively, with adjoining dams, and other incidental work. Length of contract, 9.73 miles.

This contract was awarded December 9, 1910, and transferred April 19, 1911, to Henry P. Burgard. The contract price is $2,323,998.50.

Work on this contract was begun during April.

The following table gives a summary of the work done during the year and the total work done to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$1,000	$140	$140	14	14
Excavation.....cu. yds.	954,000	349,010	349,010	36.5	36.5
Maintaining navigation.....lump sum	$500	$125	$125	25	25
Removal of bridge superstructures...lump sum	$300	$300	$300	100	100

Total of all work done during year = 26.1 per cent of estimated cost.
Total of all work done to date = 26.1 per cent of estimated cost.

CAYUGA AND SENECA CANAL, RESIDENCY NO. 1.

Resident Engineer L. S. Hulburd reports:

This residency has extended from the junction of the Cayuga and Seneca canal with the Erie canal near Montezuma aqueduct to deep water in Cayuga lake, and from Cayuga lake along the Seneca river to deep water in Seneca lake, a distance of twenty-three miles, but on May 1, 1911, the residency was divided and a new office established in Waterloo by Mr. A. E. Steere, Resident Engineer. The limits of this residency have not been determined.

Two contracts, called A and B, have been let during the year and plans are being prepared in Albany for the remainder of the work, which is divided into four contracts, as follows: Contract C, providing a lock and dam near Demont's bridge; contract D, for the construction of a lock and prism below Seneca Falls; contract E, for the construction of a lock in Seneca Falls and the prism between Seneca Falls and Waterloo, and contract F, for the construction of a lock at Waterloo.

Surveys have been made for twenty parcels of land appropriated for use on contract B, and three parcels on contract A. The center line was established on contract B from Montezuma to Cayuga lake, the base line checked on the entire residency and about one-half monumented. The blue line was located in the field from Seneca Falls to Demont's bridge, and surveys made for land to be appropriated under contracts C and D. A few borings were taken in the fall of 1910 and detail surveys furnished the Division Engineer, as requested.

The work which has been put under construction on the Cayuga and Seneca canal is being done under two contracts, namely, A and B.

Contract A.

This contract was let to Scott Brothers, on December 30, 1910, and provides for constructing lock No. 1 and dam No. 1 at the outlet of Cayuga lake. Work was started in February, 1911. Steel sheet-piling was driven around the west wall of the lock and excavating was done with a clam-shell excavator. Concreting was begun on June 6 and at the present time all of the west wall of the lock is complete. The excavator has begun excavating



BARGE CANAL, CONTRACT NO. 50.

Looking south along the site of the dam which will hold back the waters to form Hinckley reservoir. The beginning of operations is shown.



BARGE CANAL, CONTRACT NO. 50.

View of the beginning of the core wall, looking south along the line of Hinckley reservoir dam.

for the main part of the lock and the east wall at south end, and is loading the material upon cars to be drawn to the spoil area north of lock. A single line of steel sheet-piling has been driven between the lock and the old canal for a distance of 100 feet from the south end of the lock, and the excavation for the center and the east wall is being done without the bracing and double rows of steel piling that were used in constructing the west wall. The engineering work has been in charge of R. W. Cady, Assistant Engineer.

The following table gives the summary of work done during the year:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$100				
Excavation.....cu. yds.	70,300	11,462	11,462	16.3	16.3
Borrow pit excavation.....cu. yds.	12,000			0	0
First-quality sheeting and bracing...ft. B. M.	80,000	90,496	90,496	113.1	113.1
Second-quality sheeting and bracing.ft. B. M.	242,000	33,729	33,729	13.9	13.9
Forming embankment.....cu. yds.	11,000			0	0
Sawed lumber.....ft. B. M.	22,000			0	0
White oak lumber in miter-sills.....ft. B. M.	8,000			0	0
Foundation piles.....lin. ft.	10,400			0	0
Wooden sheet-piling.....ft. B. M.	95,000			0	0
First-quality steel piling.....sq. ft.	23,300	22,758	22,758	97.7	97.7
Second-quality steel piling.....sq. ft.	73,000	2,558	2,558	3.5	3.5
Second-class concrete.....cu. yds.	23,400	4,991	4,991	21.3	21.3
Second-class riprap.....cu. yds.	1,380			0	0
Wrought iron pipe and specials.....lbs.	4,000			0	0
Structural steel.....lbs.	11,400	861	861	7.6	7.6
Metal reinforcement.....lbs.	40,900	1,519	1,519	3.7	3.7
Iron castings, plain.....lbs.	7,000	1,353	1,353	19.3	19.3
Iron castings, machined.....lbs.	7,400	3,214	3,214	43.5	43.5
Metal in lock-gates.....lbs.	196,000	1,875	1,875	1	1
Metal in buffer-beams.....lbs.	93,000			0	0
Metal in lock-valves.....lbs.	24,000			0	0
Metal in Taintor gates.....lbs.	325,800			0	0
Removing buildings.....No.	3			0	0
Coffer-dams, pumping, bailing and draining.....lump sum	$18,000	8.7%	8.7%	8.7	8.7
Storehouse.....No.	1			0	0
Maintaining navigation.....lump sum	$500			0	0

Contract B.

This contract was awarded to Crowell-Sherman-Stalter Co. on December 29, 1910. It provides for dredging a river channel from Montezuma to deep water in Cayuga lake, from Cayuga lake to Seneca Falls and from Waterloo to deep water in Seneca lake.

In January, 1911, the contractors began clearing on the land cut from Cayuga lake toward Demont's bridge and completed the

clearing and blowing of stumps on this part of the prism during the winter. A small amount of the clearing was done on the spoil area west of Seneca river and north of Mud lock and the timber dike erected along the river side of the spoil area.

The dredge *Clyde,* which was used by Crowell-Sherman-Stalter Co. on their contract No. 47, was brought up the Seneca river during March, 1911, and began excavating near Station 5653, about one-half mile south of Free bridge, continuing southward in a land cut to Station 5687, dredging one-half the required depth. The dredge was then taken back to the river and brought up to Cayuga lake, where a completed channel was made from Mud lock to Cayuga village and also from Cayuga lake to the end of the cut east of Demont's bridge. A temporary stone and brush dam was built in the Seneca river a short distance below Free bridge, to maintain the level of Cayuga lake. At the end of the fiscal year the dredge is starting north to make the cut from Mud lock to Montezuma.

During the month of August, 1911, this dredge removed 480,611 cubic yards of pay material (630,000 cubic yards gross yardage), making a channel in Cayuga lake 200 feet wide and 6,700 feet long and spoiling the material in the lake west of the cut.

Mr. B. I. Hall, Assistant Engineer, has been in charge of the contract for the State.

The following table gives the summary of the work done during the year:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$1,500	½%	7%	7	7
Excavation.....cu. yds.	6,400,000	1,664,278	1,664,278	26	26
Excavating old masonry.....cu. yds.	1,250			0	0
First-quality sheeting and bracing....ft. B. M.	40,000			0	0
Second-quality sheeting and bracing..ft. B. M.	40			0	0
Forming embankment.....cu. yds.	1,000			0	0
Foundation piles.....lin. ft.	9,000			0	0
Wooden sheet-piling.....ft. B. M.	100			0	0
Second-class concrete.....cu. yds.	3,000			0	0
Wash wall.....cu. yds.	1,000			0	0
Second-class riprap.....cu. yds.	2,000			0	0
Third-class riprap.....cu. yds.	350			0	0
Fourth-class riprap.....cu. yds.	2,000			0	0
Bailing and draining.....lin. ft. wall	600			0	0
Maintaining highway traffic.....lump sum	$2,500			0	0
Maintaining navigation.....seasons	3			0	0



BARGE CANAL, CONTRACT NO. 50.
View of the site of Hinckley reservoir dam from the bank of West Canada creek.



BARGE CANAL, CONTRACT NO. 50.
Looking south along the core wall of Hinckley reservoir dam.

CAYUGA AND SENECA CANAL, RESIDENCY NO. 2.

Resident Engineer A. E. Steere reports:

I was assigned to the Waterloo residency on May 3, opening an office on the 15th, and equipping the same with furniture and supplies.

A party was organized on June 1, for making additional wash borings, which were completed about three weeks later. From the latter part of June until about the first of September the force was engaged in making topographic and property surveys for a contract through the village of Waterloo. During the month of September preliminary surveys and drive rod soundings were in progress for extending the Cayuga and Seneca canal from Watkins to Montour Falls, following the line of the old Chemung canal; also surveys for the Glen creek stream entrance to the canal.

WATER-SUPPLY RESIDENCY.

Resident Engineer L. C. Hulburd reports:

This residency comprises the work of providing the additional water-supply required by the Barge canal for the "Rome summit level." The sources of supply selected for immediate development are the Mohawk river, West Canada creek and Nine-Mile creek. The projects consist of reservoirs for impounding the flood flow of the Mohawk river and the West Canada creek, controlling works for regulating the flow out of the reservoirs and a diverting channel which will carry a portion of the flow of the West Canada creek and Nine-Mile creek. The main features of these projects are embraced in three contracts, Nos. 50, 51 and 55.

Contract No. 50.

This contract is for constructing a reservoir and dam on the West Canada creek, and performing all other work appertaining to the contract. Mr. George H. Briggs and Mr. Carl L. Bannister, Assistant Engineers, have had charge of the work. This contract was awarded to the Buffalo Dredging Co. on September 23, 1910. Actual construction began on November 16, 1910.

The following table shows the progress of the construction to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$20,500	7%	7%	7.0	7.0
Excavation.....cu. yds.	137,700	42,082	42,082	30.6	30.6
Sheeting and bracing.....ft. B. M.	420,000	148,239	148,239	35.3	35.3
Embankment.....cu. yds.	602,000	43,694	43,694	7.2	7.2
Third-class concrete.....cu. yds.	36,450	7,117	7,117	19.5	19.5
Coffer-dams, pumping, bailing and draining.....lump sum	$18,000	5.5%	5.5%	5.5	5.5
Maintaining highway traffic.....lump sum	$500	50%	50%	50.0	50.0
Gross estimate.....	$965,515	$76,220	$76,220	7.9	7.9

Contract No. 51.

This contract is for constructing a canal feeder between Trenton Falls and Nine-Mile creek, together with a gate house, culverts and all other work appertaining to the contract. Mr. W. J. Durkan, Assistant Engineer, has had charge of the work. The contract was awarded to George T. Cunningham on December 23, 1910, and was later assigned to the Alto Construction Company. Work was begun on the contract the early part of February, 1911.

The following table shows the progress of construction to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$200	70%	70%	70.0	70.0
Excavation.....cu. yds.	517,500	115,613	115,613	22.3	22.3
Sheeting and bracing.....ft. B. M.	112,000	605	605	0.5	0.5
Embankment.....cu. yds.	93,000	1,500	1,500	1.6	1.6
Foundation piles.....lin. ft.	6,500	340	340	5.2	5.2
Wooden sheet-piling.....ft. B. M.	20,000	3,665	3,665	18.3	18.3
Second-class concrete.....cu. yds.	3,660	123	123	3.4	3.4
Reinforced concrete.....cu. yds.	960	7	7	0.7	0.7
Metal reinforcement.....lbs.	36,400	85	85	0.2	0.2
Coffer-dams, pumping, bailing and draining.....lump sum	$9,000	5%	5%	5.0	5.0
Maintaining highway traffic.....lump sum	$500	5%	5%	5.0	5.0
Office building.....No.	1	1	1	100.0	100.0
Gross estimate.....	$389,842 50	$56,650	$56,650	14.5	14.5

Contract No. 55.

This contract is for constructing a reservoir dam on the Mohawk river; relocating a portion of the Black River canal; building four locks and performing all other work appertaining to the contract. Mr. Charles W. Costello, Assistant Engineer, has been in charge



BARGE CANAL, CONTRACT NO. 55.

Aqueduct and flight of locks for the relocated Black River canal, just below the dam of the Delta reservoir.

of the work. This contract was awarded to Arthur McMullen on October 19, 1908. The assemblying of plant was immediately commenced and the construction has been pushed vigorously to date.

The relocated canal, including the flight of locks, aqueduct and single lock, has been completed except the connection at its southerly end with the existing canal; the main dam has been completed excepting two sections, which have been left to pass the Black River canal and the flow of the river; the four 60-inch pipes with their controlling works have been placed, and the secondary dam, forming the pool into which they discharge, has been finished; the lower gate chamber is finished and the superstructure of the upper gate house completed except the interior finish; the grading of highways and placing of bank protection below the dam are well along, and the clearing of areas above the dam are nearing completion.

The following table, including alterations and increases as authorized by the Canal Board, shows the progress of construction to date.

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$4,500	38%	90%	38	90
Grubbing.....cu. yds.	6,600	137	5,273	2.1	79.9
Excavation.....cu. yds.	355,200	24,954	323,705	9.8	91.1
Sheeting and bracing.....ft. B. M.	55,000	31,390	51,390	57.1	93.4
Channeling.....sq. ft.	25,200	0	7,265	0	28.8
Embankment.....cu. yds.	160,550	20,430	112,229	12.7	69.9
Lining.....cu. yds.	464	275	275	59.3	59.3
Puddle.....cu. yds.	820	452	610	55.1	74.4
Sawed lumber.....ft. B. M.	27,000	15,352	22,010	56.9	81.5
Round timber bracing.....lin. ft.	1,000	19	417	1.9	41.7
Foundation piles.....lin. ft.	820	783	783	95.5	95.5
Second-class concrete.....cu. yds.	21,600	3,198	20,669	61.1	95.7
Reinforced concrete.....cu. yds.	927	700	704	75.5	75.9
Cyclopean masonry.....cu. yds.	85,400	15,538	71,477	18.2	83.7
Slope wall, in mortar.....cu. yds.	80	54	54	67.5	67.5
Slope wall, dry.....cu. yds.	80	53	53	66.3	66.3
Wash wall.....cu. yds.	340	195	195	57.4	57.4
24-inch stone paving.....sq. yds.	2,520	759	759	30.1	30.1
First-class stone paving.....sq. yds.	640	519	519	81.1	81.1
Second-class stone pavings.....sq. yds.	1,460	1,118	1,118	76.6	76.6
First-class riprap.....cu. yds.	60	52	52	86.7	86.7
Second-class riprap.....cu. yds.	80	74	74	92.5	92.5
Third-class riprap.....cu. yds.	1,216	200	200	16.4	16.4
Fourth-class riprap.....cu. yds.	330	177	177	53.6	53.6
Cast iron pipe and specials.....lbs.	290,000	32,843	291,272	11.3	100.4
Structural steel.....lbs.	79,160	23,681	56,049	29.9	70.8
Metal reinforcement.....lbs.	68,970	63,391	66,109	91.9	95.9
Wrought iron.....lbs.	9,700	7,279	7,875	75	81.2
Steel castings.....lbs.	40	25	25	62.5	62.5
Iron castings, plain.....lbs.	34,000	13,683	19,391	40.2	57
Iron castings, machined.....lbs.	81,400	34,256	92,535	42.1	113.7
Bronze castings.....lbs.	920	1,026	1,026	111.5	111.5



Black River Survey.

Chapter 190, of the Laws of 1911, directed the State Engineer to make a survey and prepare plans and estimates for improving the Black river for navigation between the State dam at Carthage and Sacketts Harbor on Lake Ontario.

Soon after the enactment of this law a party was put in the field to make the necessary surveys. Louis A. Burns, the Engineer in charge of these surveys, makes the following report concerning the progress that has been made to the end of the calendar year, 1911:

Canal Line.

The status of the work which is now being done under chapter 190, of the Laws of 1911 (known as the Black River Survey), can be best understood by first briefly describing the principal proposed routes. The accompanying map will supplement the description.

Description.

Camps Ditch Line. This line leaves Lake Ontario from Black River bay at the mouth of Mill creek, or in other words, near Madison barracks in the village of Sacketts Harbor. Thence the route extends up the valley of this creek until the hamlet of Sulphur Springs is reached. Here it follows the wide, level valley which continues into the lower part of the city of Watertown, arriving near what is known as the lower junction freight yards.

Beaver Meadow Line. One mile southwest of the point where the Camps Ditch line crosses the city limits of Watertown begins what is known as the Beaver Meadow line. This extends up the valley of Beaver Meadow creek, thence through the southern portion of Watertown, entering the Black river at the Huntingtonville level.

Muskalonge Creek Line. This line leaves Lake Ontario from Muskalonge bay, which is three miles northeasterly from the village of Sacketts Harbor and is an indentation of Black River bay. Extending up the valley of Muskalonge creek, the line continues in an easterly direction and enters the Black river at Glen Park. It then follows the river channel to the mouth of Cowan's creek,

which is across the river from the fair grounds in the city of Watertown. From this point a northeasterly direction is pursued in the valley of this creek, and, passing close to the north side freight yards, it continues in this natural depression until Cory's limekiln is reached. Here it takes either a southeasterly direction into the Huntingtonville level or an easterly one into a higher level.

Black River Line. In the vicinity of the village of Black River the various lines converge and follow the river to the village of Carthage, entering the navigable waters above, which form part of the Black River canal system.

Method.

Complete topographic surveys have been made along the various lines and location maps have been plotted, covering a strip of from a quarter to a half mile wide. Base lines have been run in closed circuits and azimuths of these lines completely verified by observations on the star Polaris. Coördinates have been computed, based on true latitude and longitude, in order to make the greatest use of the Government topographic sheets which cover this locality. The scale used in making our maps is 100 feet to one inch. This will enable a profile and cross-sections to be taken from them, after the center line of the proposed canal has been projected thereon. Thus an accurate estimate can be computed and sites of the structures shifted without further surveying. Where the character of the underlying material was not evident, rod soundings and other investigations have been made.

Progress.

On Camps Ditch Line.— Surveys have been completed; maps have been plotted; rod soundings have been made.

On Beaver Meadow Line.—Surveys have been completed; maps have been plotted; rod soundings have been made.

On Muskalonge Creek Line.—Surveys have been completed; maps have been plotted as far as the city of Watertown; rod soundings have been made.

On Black River Line.—Surveys have been completed; coördinates have been computed for control of maps.

[redacted] the city of

WATER-SUPPLY.

Description.

The volume of water discharged throughout the year by each of the streams under consideration is now being ascertained. Rainfall and run-off data from the Government records and other sources for previous years have been compiled. The most feasible reservoir sites have been examined, relative to their capacity and adaptability for feeding purposes under the several possible locations and heights of dams. The value of the land which would be flooded has been, by proper inquiries, accurately determined. The costs of the necessary structures, in an approximate way, have been computed, as a matter of preliminary study.

Method and Progress.

On the portion of the North branch of Sandy creek which is available for storage the only dam that could have been used for stream measurements has been washed out. Consequently it was necessary to build a weir.

On the East branch of Sandy creek, a mill dam in the village of Rodman is used to make discharge measurements. At present, readings are being taken of the amounts flowing over the crest itself, before the wheels are started in the morning, thus eliminating the uncertainty of having to use in our computations the discharge of rather old, uncalibrated types of wheels.

Near Copenhagen measurements of the Deer river are being taken, which will give data at a point below the most suitable sites for flood water storage reservoirs.

Immediately above Felts Mill, discharges of the Black river are being taken daily and the results of measurements throughout many years are on record.

The water supply feature of the project will be taken up in detail as soon as the work on the canal proper will allow. When suitable maps are available, plans and estimates will be made of the necessary dams, reservoirs and feeders.

SUMMARY.

Surveying has been about 90 per cent completed, by having done the following amount of work:

Levels. Bench levels run, 63 miles.

Topography. Stadia base line run, 71.54 miles. Topography shots taken, 12,600.

Hydrography. Some 200 cross-sections and about 20 miles of river profile have been sounded.

Office Work. Maps are about 30 per cent completed. Coördinate computations have been completed. Reduction of field notes has been completed.

Borings (rod soundings). Linear feet driven, 2,483.

WORK STILL NECESSARY.

On Canal Line:—

Map making.
Location of canal line on maps.
Picking off cross-sections and profiles.
Placing of locks and other structures.
Computations of quantities.
Tracing of maps.
Comparison of the various lines.
Report on canal.

On Water-Supply:—

Computations:
- Volume of necessary water to run canal.
- Available run-off on the various reservoir sites.
- Cost of storage reservoirs and feeders.

Maps:
- Of the various sites and feeders, either from actual surveys or compiled.

Drawings:
- Showing the types and sizes of dams and feeders to be used.

Report on water-supply.

THE FOLLOWING STATEMENTS SHOW THE NAMES, RANK AND COMPENSATION OF ENGINEERS EMPLOYED IN THE MIDDLE DIVISION OF THE DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR, TOGETHER WITH INCIDENTAL EXPENSES, FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Ordinary Repairs — Erie Canal.

Chapter 512, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Edwin Styring	Division engineer	$350 00 per month	$300 00		$300 00
Guy Moulton	Division engineer	350 00 per month	212 50	$6 66	219 16
Guy Moulton	First resident engineer	250 00 per month	150 00	1 30	151 30
L. D. Brownell	Assistant engineer	6 00 per day	474 00	10 95	484 95
D. E. Whitford	Assistant engineer	6 00 per day	324 00		324 00
R. K. Sheldon	Assistant engineer	6 00 per day	121 00	4 12	125 12
E. J. Berry	Leveler	5 00 per day			
Carl F. Hopstein	Draftsman	5 00 per day	5 00	90	5 90
Henry L. Bassett	Financial clerk	150 00 per month	314 52		314 52
John D. Scanlon	Cashier	150 00 per month	150 00		150 00
W. S. Morris	Estimate clerk	125 00 per month	575 00	1 55	576 55
Harvey Wagoner	Stenographer	100 00 per month	500 00		500 00
Jerry J. Ryan	Tracer	75 00 per month	33 87		33 87
Paul Kelly	Chauffeur	100 00 per month	170 00		170 00
John Connors	Laborer	2 00 per day	266 00		266 00
Clark H. Norton	Laborer	2 00 per day	572 00		572 00
Henry McLaughlin	Laborer	2 00 per day	322 00		322 00
F. B. Ostrander	Laborer	2 00 per day	54 00		54 00
Ferdinand Smith	Laborer	2 00 per day	360 00		360 00
Louis C. Ryan	Laborer	2 00 per day	210 00		210 00
Frank A. Wiltse	Laborer	2 00 per day	208 00	18 50	226 50
Geo. Donovan	Laborer	2 00 per day	10 00		10 00
			$5,331 89	$50 98	$5,375 87

Incidental Expenses.

Livery	$12 50	
Stationery and printing	58 70	
Fuel and light	596 25	
Postage	164 44	
Telephone and telegraph	578 16	
Miscellaneous	1,776 32	
		3,186 37
Total		$8,562 24

Ordinary Repairs — Cayuga and Seneca Canal.

Chapter 512, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Guy Moulton	First resident engineer	$250 00 per month	$112 50	$8 18	$120 68
L. D. Brownell	Assistant engineer	6 00 per day	6 00	5 00	11 00
E. J. Berry	Leveler	5 00 per day		2 58	2 58
Total			$118 50	$15 76	$134 26

Ordinary Repairs — Oswego Canal.

Chapter 512, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Guy Moulton	First resident engineer	$250 00 per month	$50 00	$3 50	$53 50

Construction of Barge Canal — Erie Canal.

Chapter 147, Laws of 1903, and amendatory laws.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Edwin Styring	Division engineer	$350 00 per month	$1,000 00	$152 74	$1,152 74
Guy Moulton	Division engineer	350 00 per month	624 26	63 26	687 46
Guy Moulton	First resident engineer	250 00 per month	812 50	92 90	905 40
Edwin Styring	Resident engineer	250 00 per month	1,078 57	100 80	1,179 37
L. C. Hulburd	Resident engineer	250 00 per month	2,962 50	247 96	3,210 46
Earle Talbot	Resident engineer	250 00 per month	1,000 00	182 44	1,182 44
S. M. Savage	Resident engineer	250 00 per month	439 52	50 07	489 59
Daniel B. Donovan	Resident engineer	250 00 per month	1,892 86	65 11	1,957 97
John R. Baxter	Resident engineer	250 00 per month	1,225 81	2 45	1,228 26
D. C. Wedgeworth	Resident engineer	225 00 per month	2,525 00	172 17	2,697 17
L. D. Brownell	Assistant engineer	6 00 per day	288 00	64 64	352 64
Foster B. Crocker	Assistant engineer	6 00 per day	1,740 00	255 96	1,995 96
C. R. Chase	Assistant engineer	6 00 per day	1,656 00	544 17	2,200 17
Otto Brown	Assistant engineer	5 00 per day	665 00	42 10	707 10
A. G. Crysler	Assistant engineer	6 00 per day	1,884 00	103 17	1,987 17
H. C. Smith	Assistant engineer	6 00 per day	1,878 00	198 92	2,076 92
H. J. O'Neill	Assistant engineer	6 00 per day	1,872 00	53 15	1,925 15
R. W. Cady	Assistant engineer	6 00 per day	514 00		514 00
J. G. Palmer	Assistant engineer	6 00 per day	2,022 00	434 04	2,456 04
R. R. Stuart	Assistant engineer	6 00 per day	966 00	110 56	1,076 56
Carl L. Bannister	Assistant engineer	6 00 per day	1,890 00	106 12	1,996 12
W. J. Durkan	Assistant engineer	6 00 per day	1,779 50	95 24	1,874 74
Chas. W. Costello	Assistant engineer	6 00 per day	1,902 00	117 67	2,019 67
Albert G. Card	Assistant engineer	5 50 per day	594 00		594 00
J. B. Whipple	Assistant engineer	5 50 per day	577 50		577 50
W. S. Saxton	Assistant engineer	5 50 per day	577 50		577 50
Geo. H. Briggs	Assistant engineer	6 00 per day	1,890 00	61 10	1,951 10
W. A. Lafler	Assistant engineer	6 00 per day	342 00	41 25	383 25
Daniel B. Donovan	Assistant engineer	6 00 per day	696 00	55 01	751 01
C. H. Rogers	Assistant engineer	6 00 per day	156 00	10 10	166 10
Albert G. Card	Leveler	5 00 per day	1,060 00		1,060 00
J. B. Whipple	Leveler	5 00 per day	1,040 00		1,040 00
John F. Greathead	Leveler	5 00 per day	1,595 00		1,595 00
Irvin S. Badger	Leveler	4 50 per day	1,404 00		1,404 00
D. J. Levinson	Leveler	5 00 per day	1,575 00		1,575 00
R. E. Swinney	Leveler	5 00 per day	1,615 00		1,615 00
N. R. McLoud	Leveler	5 00 per day	1,695 00	161 77	1,856 77
Edward J. Berry	Leveler	5 00 per day	730 00	42 90	772 90
P. H. Budd	Leveler	4 50 per day	4 50		4 50
R. C. Hunter	Leveler	4 50 per day	850 50		850 50
E. A. Dollard	Leveler	4 50 per day	130 50		130 50
R. W. Smith	Leveler	4 50 per day	315 00		315 00
A. W. Smith	Leveler	5 00 per day	1,600 00	138 48	1,738 48
Chas. Donohue	Leveler	5 00 per day	1,512 50	41 10	1,553 60
Walter F. Shaw	Leveler	4 50 per day	1,350 00		1,350 00
Foster B. Crocker	Leveler	5 00 per day	95 00	17 67	112 67
R. K. Sheldon	Leveler	5 00 per day	395 00	24 70	419 70
W. S. Saxton	Leveler	5 00 per day	1,045 00		1,045 00
J. L. Bush	Leveler	5 00 per day	485 00		485 00
I. H. Smallwood	Leveler	4 50 per day	396 00		396 00
C. H. Adams	Leveler	4 50 per day	238 50		238 50
John J. Gawkins	Rodman	3 50 per day	1,141 00		1,141 00
Palmer C. Gallup	Rodman	4 00 per day	1,256 00		1,256 00
William B. Cook	Rodman	4[illegible]00 per day	1,226 00		1,226 00

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
George H. Thomas	Rodman	$4 00 per day	$1,440 00		$1,440 00
S. B. Sheridan	Rodman	3 50 per day	1,120 00	$1 85	1,121 85
J. L. Doyle	Rodman	3 50 per day	1,109 50		1,109 50
M. W. Wholgemuth	Rodman	3 50 per day	1,105 50		1,105 50
D. L. Palmer	Rodman	3 50 per day	507 50		507 50
Don A. Wilcox	Rodman	4 00 per day	651 50		651 50
C. H. Adams	Rodman	4 00 per day	820 00	85	820 85
George F. Baker	Rodman	3 50 per day	3 50		3 50
F. M. White	Rodman	3 50 per day	245 00		245 00
S. D. Hendricks	Rodman	4 00 per day	440 00		440 00
Max Goodman	Rodman	3 50 per day	651 00		651 00
I. H. Smallwood	Rodman	4 00 per day	988 00		988 00
Edmund F. Ludden	Rodman	3 50 per day	38 50		38 50
F. A. Gordman	Rodman	4 00 per day	1,256 00		1,256 00
J. A. Sloat	Rodman	4 00 per day	1,252 00		1,252 00
H. J. Stevens	Rodman	4 00 per day	1,226 00		1,226 00
H. C. Smith	Rodman	3 50 per day	395 50		395 50
D. A. McClellan	Rodman	3 50 per day	315 00		315 00
Edgar N. Scott	Rodman	3 50 per day	343 00		343 00
Louis R. Bennett	Rodman	3 50 per day	318 50		318 50
Lynde Coit	Rodman	3 50 per day	357 00		357 00
W. D. Wilson	Rodman	3 50 per day	322 00		322 00
I. S. Badger	Rodman	3 50 per day	31 50		31 50
Casper M. Connery	Rodman	3 50 per day	273 00		273 00
Thomas L. Way	Rodman	3 50 per day	539 00		539 00
Joseph Wechsler	Rodman	3 50 per day	21 00		21 00
J. Mockler	Rodman	3 50 per day	504 00		504 00
John J. Phalan	Rodman	3 50 per day	476 00		476 00
Vernon Vanderburg	Rodman	3 50 per day	437 50		437 50
J. S. Bierhardt	Rodman	3 50 per day	423 50		423 50
Don A. Wilcox	Chainman	3 00 per day	84 00		84 00
L. A. Kavanagh	Chainman	3 00 per day	993 00		993 00
Frank Lutz	Chainman	3 00 per day	978 00		978 00
John J. Phalan	Chainman	3 00 per day	522 00		522 00
Henry C. Little	Chainman	3 00 per day	939 00	111 61	1,050 61
James P. Mullen	Chainman	2 50 per day	790 00		790 00
Roy E. Homan	Chainman	2 50 per day	782 50		782 50
H. C. Smith	Chainman	3 00 per day	657 00		657 00
Howard W. Loftus	Chainman	2 50 per day	717 50		717 50
Morris Alter	Chainman	2 50 per day	722 50	4 85	727 35
W. J. Curtis	Chainman	2 50 per day	635 00		635 00
Morris Strauss	Chainman	2 50 per day	352 50	1 28	353 78
G. Lyle Stillman	Chainman	2 50 per day	202 50		202 50
J. T. Phalan	Chainman	2 50 per day	237 50		237 50
Mathew J. Chryst	Chainman	3 00 per day	276 00		276 00
E. C. Neudecker	Chainman	2 50 per day	157 50		157 50
Clarence L. Fox	Chainman	2 50 per day	175 00		175 00
J. J. Stahl	Chainman	2 50 per day	122 50		122 50
Jos. J. Darcy	Chainman	2 50 per day	67 50		67 50
William Smutzler	Chainman	2 50 per day	337 50		337 50
Isaac Kaufman	Chainman	2 50 per day	252 50		252 50
J. H. McEntee	Chainman	2 50 per day	287 50		287 50
D. E. Robins	Chainman	2 50 per day	45 00		45 00
A. R. Hamilton	Chainman	2 50 per day	32 50		32 50
C. N. Budlong	Chainman	2 50 per day	45 00		45 00
Daniel Keating	Chainman	2 50 per day	182 50		182 50
Geo. F. Sexton	Chainman	2 50 per day	272 50		272 50
J. L. Dowd, Jr	Chainman	2 50 per day	315 00		315 00
H. S. Miller	Chainman	2 50 per day	37 50		37 50
E. G. Warner	Chainman	2 50 per day	387 50		387 50
Morris Podolsky	Chainman	2 50 per day	60 00		60 00
Phillip Schwartz	Chainman	2 50 per day	15 00		15 00
J. J. J. Quinn	Chainman	2 50 per day	360 00		360 00
F. E. Simpson	Chainman	2 50 per day	295 00		295 00
R. E. Gallivan	Chainman	3 00 per day	359 50	5 21	364 71
John D. Scanlon	Cashier	150 00 per month	300 00		300 00
Henry L. Bassett	Financial clerk	150 00 per month	150 00		150 00
Arthur B. Dewey	Confidential stenographer	125 00 per month	250 00		250 00
W. S. Morris	Estimate clerk	125 00 per month	750 00	2 83	752 83
Harvey Wagner	Stenographer	100 00 per month	300 00		300 00
L. J. Mulhauser	Stenographer	100 00 per month	1,200 00		1,200 00
Fanny L. Borden	Stenographer	50 00 per month	440 00		440 00
C. F. Hopstein	Draftsman	5 00 per day	1,125 00	169 76	1,294 76

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
R. M. Fraser	Draftsman	$5 00 per day	$1,539 00		$1,539 00
I. H. Segal	Draftsman	4 00 per day	28 00		28 00
C. G. Lamphere	Tracer	75 00 per month	687 09	$23 70	710 79
Jerry J. Ryan	Tracer	75 00 per month	176 94	3 96	180 90
W. J. Kelly	Inspector	5 00 per day	1,730 00		1,730 00
S. M. Stuart	Inspector	5 00 per day	1,660 00		1,660 00
W. A. Walter	Inspector	5 00 per day	630 00		630 00
Alfred Evans	Inspector	5 00 per day	15 00		15 00
J. B. Doughty	Inspector	3 50 per day	192 50		192 50
H. W. Stoneburg	Foreman of borings	4 00 per day	772 00		772 00
Warden T. Marriot	Axeman	2 50 per day	773 00		773 00
Lyle Stillman	Axeman	2 00 per day	430 75		430 75
Howard W. Loftus	Axeman	2 00 per day	52 00		52 00
F. R. Simmonds	Axeman	2 00 per day	388 00		388 00
J. H. McEntee	Axeman	2 00 per day	216 00		216 00
Isaac Kaufman	Axeman	2 00 per day	82 00		82 00
A. W. Bischell	Axeman	2 00 per day	248 00		248 00
Paul Kelly	Chauffeur	100 00 per month	100 00		100 00
Oscar Svenson	Boatman	3 00 per day	870 00	32 31	902 31
T. J. Alcorn	Boatman	3 00 per day	369 00		369 00
Daniel Kilmore	Boatman	3 00 per day	234 00		234 00
Chas. Rogers	Boatman	3 00 per day	174 00		174 00
F. R. Simmonds	Boatman	3 00 per day	78 00		78 00
C. Sponenburg	Boatman	3 00 per day	234 00		234 00
Wm. H. Rundle	Boatman	3 00 per day	618 00		618 00
E. P. Downer	Boatman	3 00 per day	540 00		540 00
Wm. Potter	Boatman	3 00 per day	543 00		543 00
J. L. Cook	Boatman	3 00 per day	162 00		162 00
Joseph F. O'Brien	Boatman	3 00 per day	411 00		411 00
Fred Sweet	Boatman	3 00 per day	372 00		372 00
J. D. Cahill	Boatman	3 00 per day	330 00		330 00
Henry M. Kirk	Boatman	3 00 per day	213 00		213 00
Thomas Gray	Boatman	3 00 per day	27 00		27 00
Joseph F. O'Brien	Laborer	2 00 per day	362 00		362 00
Geo. Grogan	Laborer	2 00 per day	636 00		636 00
Spencer B. Randall	Laborer	2 00 per day	560 00		560 00
Wm. Farrier	Laborer	2 00 per day	644 00		644 00
A. T. Sanders	Laborer	2 00 per day	106 00		106 00
James Keating	Laborer	2 00 per day	668 00		668 00
Joseph Keating	Laborer	2 00 per day	120 00		120 00
F. B. Ostrander	Laborer	2 00 per day	246 00		246 00
John Copia	Laborer	2 00 per day	112 00		112 00
Joseph Reh	Laborer	2 00 per day	640 00		640 00
Bert Forbes	Laborer	2 00 per day	266 00		266 00
John McElroy	Laborer	2 00 per day	640 00		640 00
Clarence Phelps	Laborer	2 00 per day	498 00		498 00
Leo F. Johnson	Laborer	2 00 per day	38 00		38 00
Harvey Roberts	Laborer	2 00 per day	130 00		130 00
J. H. McEntee	Laborer	2 00 per day	160 00		160 00
Axel Clark	Laborer	2 00 per day	90 00		90 00
H. M. Fancher	Laborer	2 00 per day	590 00		590 00
Henry M. Laughlin	Laborer	2 00 per day	60 00		60 00
Leo B. Brennon	Laborer	2 00 per day	104 00		104 00
Henry Turk	Laborer	2 00 per day	54 00		54 00
Wm. P. Rayland	Laborer	2 00 per day	268 00		268 00
Ben Sexton	Laborer	2 00 per day	272 00		272 00
Samuel DeLano	Laborer	2 00 per day	336 00		336 00
C. Fred Betts	Laborer	2 00 per day	396 00		396 00
W. T. Tanner, Jr.	Laborer	2 00 per day	652 00		652 00
Terrence Cooney	Laborer	2 00 per day	244 00		244 00
Geo. E. Cahill	Laborer	2 00 per day	546 00		546 00
W. E. Hulburt	Laborer	2 00 per day	62 00		62 00
Theodore M. Wood	Laborer	2 00 per day	90 00		90 00
Cornelius Donovan	Laborer	2 00 per day	116 00		116 00
Frank J. Lynch	Laborer	2 00 per day	210 00		210 00
N. E. Dillenbeck	Laborer	2 00 per day	17 50		17 50
Frank A. Wiltse	Laborer	2 00 per day	98 00		98 00
J. M. Lanigan	Laborer	2 00 per day	174 00		174 00
Archie Hall	Laborer	2 00 per day	128 00		128 00
Otis Van Wie	Laborer	2 00 per day	180 00		180 00
Graydon Scott	Laborer	2 00 per day	52 00		52 00
Horace Stewart	Laborer	2 00 per day	260 00		260 00
Andrew Dardis	Laborer	2 00 per day	272 00		272 00

Construction of Barge Canal — Erie Canal — (Concluded).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Henry Akins	Laborer	$2 00 per day	$228 00		$228 00
J. Delaney, Jr	Laborer	2 00 per day	64 00		64 00
Lester Grogan	Laborer	2 00 per day	143 00		143 00
D. D. Donovan	Laborer	2 00 per day	152 00		152 00
James Ward	Laborer	2 00 per day	120 00		120 00
Marie Brandt Brown	Gage reader	7 00 per month	84 00		84 00
Daniel Brown	Gage reader	7 00 per month	84 00		84 00
John Carroll	Gage reader	7 00 per month	56 70		56 70
W. T. Crill	Gage reader	7 00 per month	84 00		84 00
W. B. Dempsey	Gage reader	7 00 per month	7 00		7 00
Mrs. A. H. Hoffmeister	Gage reader	7 00 per month	84 00		84 00
John P. Watts	Gage reader	7 00 per month	30 00		30 00
A. H. Lefebore	Gage reader	7 00 per month	77 00		77 00
Floyd Bettinger	Gage reader	7 00 per month	42 00		42 00
Wm. H. Burns	Gage reader	5 00 per month	28 67		28 67
Clyde Judge	Gage reader	7 00 per month	27 30		27 30
E. A. Hulburt	Gage reader	7 00 per month	84 00		84 00
Bessie C. Kellogg	Gage reader	7 00 per month	42 00		42 00
H. F. Mason	Gage reader	7 00 per month	84 00		84 00
Marie Powell	Gage reader	7 00 per month	84 00		84 00
Henry Straub	Gage reader	7 00 per month	84 00		84 00
Griff G. Williams	Gage reader	7 00 per month	84 00		84 00
John Phillips	Gage reader	6 00 per month	72 00		72 00
W. H. Dunn	Gage reader	5 00 per month	60 00		60 00
E. A. Evans	Gage reader	5 00 per month	60 00		60 00
Chris Hannon	Gage reader	4 00 per month	48 00		48 00
Chas. Brannock	Gage reader	10 00 per month	120 00		120 00
Louis McArthur	Gage reader	10 00 per month	120 00		120 00
John R. Hiller	Gage reader	7 00 per month	84 00		84 00
Solomon Walts	Gage reader	7 00 per month	84 00		84 00
Chas. Bourke	Gage reader	5 00 per month	60 00		60 00
John Chamberlain	Gage reader	5 00 per month	60 00		60 00
W. M. Hubbard	Gage reader	5 00 per month	60 00		60 00
Mark Kennedy	Gage reader	5 00 per month	60 00		60 00
Frank Shane	Gage reader	5 00 per month	60 00		60 00
L. W. Moulton	Gage reader	5 00 per month	60 00		60 00
Frank Burns	Gage reader	5 00 per month	31 33		31 33
J. H. Rupert	Gage reader	5 00 per month	60 00		60 00
Wm. Prettie	Gage reader	5 00 per month	60 00		60 00
Mark Quimby	Gage reader	5 00 per month	60 00		60 00
Chas. Swan	Travel			$963 00	963 00
Stanwix Hall Livery	Travel			40 00	40 00
David Butler	Travel			117 00	117 00
H. G. Donovan	Travel			336 00	336 00
Fred Strowbridge	Travel			26 00	26 00
Geo. H. Shufelt	Travel			256 00	256 00
C. L. Hickland	Travel			892 00	892 00
George E. Wright	Travel			197 50	197 50
Bowen Bros	Travel			55 00	55 00
Richard Lawler	Travel			25 00	25 00
R. L. Crocker	Travel			25 00	25 00
Chas. H. Connor	Travel			198 50	198 50
Noonan Tool and Machine Works	Travel			26 75	26 75
Milton Carroll	Travel			85 00	85 00
Mrs. Grace Keating	Travel			127 50	127 50
Frank E. Henebray	Travel			150 00	150 00
James Roberts	Travel			103 50	103 50
Moses Barney	Travel			32 50	32 50
					$131,876 92
Incidental Expenses.					
Instruments and tools				$414 02	
Stationery and printing				163 78	
Fuel and light				573 04	
Postage				242 25	
Office rent				1,416 50	
Telephone and telegraph				626 78	
Miscellaneous				11,013 60	
					14,449 97
Total					$146,326 89

Construction of Barge Canal — Oswego Canal.

Chapter 147, Laws of 1903, and amendatory laws.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Edwin Styring	Division engineer	$350 00 per month	$987 50	$52 37	$1,039 87
Guy Moulton	Division engineer	350 00 per month	625 40	24 47	649 87
Guy Moulton	First resident engineer	250 00 per month	375 00	5 19	380 19
T. M. Ripley	Resident engineer	250 00 per month	2,775 00	455 47	3,230 47
James Burden	Resident engineer	250 00 per month	2,325 00	164 43	2,489 43
Geo. H. Haley	Resident engineer	250 00 per month	1,983 09	27 26	2,010 35
Louis A. Burns	Assistant engineer	6 00 per day	1,530 00	33 42	1,563 42
George C. Andrews	Assistant engineer	6 00 per day	1,884 00	3 45	1,887 45
Edward M. Ellis	Assistant engineer	6 00 per day	1,914 00	743 44	2,657 44
Chas. R. Chase	Assistant engineer	6 00 per day	342 00	19 85	361 85
R. R. Stuart	Assistant engineer	6 00 per day	60 00	2 39	62 39
R. K. Sheldon	Assistant engineer	5 50 per day	343 00	10 24	353 24
D. H. Judson	Assistant engineer	5 50 per day	1,632 50		1,632 50
H. H. Brown	Leveler	5 00 per day	1,515 00		1,515 00
Geo. C. Hannon	Leveler	5 00 per day	1,511 50		1,511 50
P. H. Budd	Leveler	5 00 per day	1,455 00	68 15	1,523 15
E. J. Berry	Leveler	5 00 per day	765 00	79 32	844 32
Frank H. Flint	Leveler	5 00 per day	1,585 00		1,585 00
William H. Hilborn	Leveler	5 00 per day	1,449 00		1,449 00
E. A. Dollard	Leveler	4 50 per day	702 00		702 00
M. D. Ewell	Leveler	5 00 per day	1,565 00	49 55	1,614 55
E. J. Clohessy	Leveler	4 50 per day	1,140 50		1,140 50
Karl Moulton	Leveler	4 50 per day	1,224 00		1,224 00
R. G. Pratt	Rodman	4 00 per day	672 00		672 00
William H. Carnrike	Rodman	3 50 per day	497 00		497 00
Leon C. Loomis	Rodman	3 50 per day	252 00		252 00
Andrew J. Crowe, Jr.	Rodman	3 50 per day	248 50		248 50
Thomas F. Colgan	Rodman	3 50 per day	154 00		154 00
Clyde E. Learned	Rodman	4 00 per day	1,108 50		1,108 50
Robert M. Mark	Rodman	3 50 per day	1,162 00		1,162 00
George F. Baker	Rodman	3 50 per day	238 00		238 00
E. F. Ludden	Rodman	3 50 per day	427 00		427 00
L. H. Wright	Rodman	4 00 per day	1,224 00		1,224 00
M. J. Chryst	Chainman	2 50 per day	7 50		7 50
J. C. Adams	Chainman	3 00 per day	1,038 00		1,038 00
Samuel Covner	Chainman	2 50 per day	527 50		527 50
W. W. Redfern	Chainman	2 50 per day	832 50		832 50
Allan T. Brown	Chainman	2 50 per day	787 50		787 50
Morris Alter	Chainman	2 50 per day	55 00		55 00
J. E. Smith	Chainman	3 00 per day	916 00		916 00
E. H. Assenheimer	Chainman	2 50 per day	782 50		782 50
W. J. Curtis	Chainman	2 50 per day	150 00		150 00
Wm. Crahan	Chainman	3 00 per day	869 50		869 50
Frank Layborn	Chainman	2 50 per day	219 00		219 00
M. J. Kelly	Chainman	2 50 per day	367 50		367 50
R. J. Storm	Chainman	2 50 per day	730 00		730 00
Robert H. Byrnes	Chainman	2 50 per day	210 00		210 00
Francis C. Curtin	Chainman	2 50 per day	160 00		160 00
Harry Blum	Chainman	2 50 per day	150 00		150 00
Earl R. Brown	Chainman	2 50 per day	135 00		135 00
Roy Engell	Chainman	2 50 per day	192 50		192 50
C. F. Hopstein	Draftsman	5 00 per day	140 00	55 37	195 37
H. A. J. Castor	Draftsman	5 00 per day	1,580 00		1,580 00
Harry Kehoe	Draftsman	5 00 per day	1,552 00	1 96	1,553 96
John D. Ettinger	Draftsman	4 00 per day	176 00		176 00
L. H. Friedman	Bridge designer	1,201 per year	217 16	12 51	229 67
Jerry J. Ryan	Tracer	75 00 per month	24 19		24 19
A. H. Hallenbeck	Inspector	5 00 per day	1,441 50		1,441 50
W. N. Dutcher	Inspector	5 00 per day	1,115 00		1,115 00
W. A. Walter	Inspector	5 00 per day	924 00		924 00
John D. Scanlon	Cashier	150 00 per month	600 00		600 00
W. S. Morris	Estimate clerk	125 00 per month	175 00		175 00
Henry L. Bassett	Financial clerk	150 00 per month	300 00		300 00
Arthur B. Dewey	Confidential stenographer	125 00 per month	88 71		88 71
Harvey Wagner	Stenographer	100 00 per month	400 00		400 00
W. D. Gartland	Stenographer	60 00 per month	700 00		700 00
Walter Collins	Stenographer	60 00 per month	396 77	6 35	403 12
A. Mossbrugger	Axeman	2 50 per day	771 50		771 50
Foster J. Beach	Axeman	2 00 per day	242 00		242 00

Construction of Barge Canal — Oswego Canal — (Concluded).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Isaac Kaufman	Axeman	$2 50 per day	$360 00		$360 00
Allen R. Type	Boatman	3 00 per day	174 00		174 00
Patrick Ryan	Boatman	3 00 per day	540 00		540 00
L. R. Phillips	Boatman	3 00 per day	162 00		162 00
James Griffin	Boatman	3 00 per day	234 00		234 00
James McKay	Boatman	3 00 per day	36 00		36 00
H. W. Stoneburg	Foreman of borings	4 00 per day	16 00	$6 85	22 85
E. M. Bonner	Laborer	2 00 per day	306 00		306 00
A. M. Roy	Laborer	2 00 per day	20 00		20 00
John Audlin	Laborer	2 00 per day	264 00		264 00
F. B. Ostrander	Laborer	2 00 per day	100 00		100 00
Jesse Penfield	Laborer	2 00 per day	522 00		522 00
Alfred Moran	Laborer	2 00 per day	114 00		114 00
William Griggs, Jr.	Laborer	2 00 per day	384 00		384 00
William Fitzgibbons, Jr.	Laborer	2 00 per day	388 00		388 00
J. M. Foley	Laborer	2 00 per day	388 00		388 00
John W. Madigan	Laborer	2 00 per day	382 00		382 00
Peter Griffin	Laborer	2 00 per day	384 00		384 00
Henry Turk	Laborer	2 00 per day	294 00		294 00
T. R. Ward	Laborer	2 00 per day	422 00		422 00
J. L. Powers	Laborer	2 00 per day	292 00		292 00
August Brady	Laborer	2 00 per day	92 00		92 00
Wm. Reck	Laborer	2 00 per day	136 00		136 00
Harry Watson	Laborer	2 00 per day	154 00		154 00
William Cronin	Laborer	2 00 per day	62 00		62 00
Daniel Mehegan	Laborer	2 00 per day	76 00		76 00
Michael E. Murray	Laborer	2 00 per day	48 00		48 00
Guy Jones	Laborer	2 00 per day	250 00		250 00
Harry G. Rose	Laborer	2 00 per day	132 00		132 00
Neil T. Hayes	Laborer	2 00 per day	92 00		92 00
Orville Siver	Laborer	2 00 per day	62 00		62 00
Lucian Clement	Laborer	2 00 per day	290 00		290 00
John Dygert	Laborer	2 00 per day	632 00		632 00
Wm. Cullen	Laborer	2 00 per day	294 00		294 00
Alonzo Clark	Laborer	2 00 per day	288 00		288 00
Frank J. Lynch	Laborer	2 00 per day	18 00		18 00
Louis C. Ryan	Laborer	2 00 per day	104 00		104 00
Thomas J. Brady	Laborer	2 00 per day	158 00		158 00
Frank M. Hughes	Gage reader	12 00 per month	65 00		65 00
George Archambo	Gage reader	6 00 per month	72 00		72 00
Arthur C. Owens	Gage reader	5 00 per month	60 00		60 00
W. W. Perry	Gage reader	5 00 per month	25 00		25 00
Smith Sharp	Gage reader	5 00 per month	60 00		60 00
L. D. Sterling	Gage reader	5 00 per month	60 00		60 00
D. D. Tompkins	Gage reader	5 00 per month	60 00		60 00
B. M. Wilcox	Gage reader	5 00 per month	60 00		60 00
Bert Thomas	Gage reader	5 00 per month	33 05		33 05
Leon Hallenbeck	Gage reader	5 00 per month	30 00		30 00
Ashley Kissinger	Livery			415 00	415 00
Fulton Livery Co	Livery			341 00	341 00
M. L. Smith	Livery			36 00	36 00
			$63,880 37	$2,614 04	$66,494 41
	Incidental Expenses.				
Instruments and tools				$259 65	
Stationery and printing				106 94	
Fuel and light				223 97	
Postage				245 85	
Office rent				1,100 71	
Telephone and telegraph				333 69	
Miscellaneous				3,791 81	
					6,062 62
Total					$72,557 03

Construction of Barge Canal — Cayuga and Seneca Canal.

Chapter 391, Laws of 1909.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Edwin Styring	Division engineer	$350 per month	$350 00	$29 44	$379 44
D. A. Watt	Supervising engineer	5,000 per year	388 89	16 72	405 61
G. F. Stickney	Supervising engineer	5,000 per year	277 77		277 77
W. H. Yates	Supervising engineer	4,000 per year	193 55	16 00	209 55
Guy Moulton	First resident engineer	250 per month		2 88	2 88
James Burden	Resident engineer	225 per month	450 00	27 27	477 27
L. S. Hulburd	Resident engineer	200 per month	2,400 00	212 45	2,612 45
G. Edward Gibson	Resident engineer	200 per month	2,173 68	12 65	2,186 33
R. E. Phillips	Resident engineer	200 per month	1,655 14	61 66	1,716 80
A. E. Steere	Resident engineer	200 per month	987 10	80 74	1,067 84
B. I. Hall	Assistant engineer	6 00 per day	1,794 00	85 76	1,879 76
H. W. Benedict	Assistant engineer	6 00 per day	1,506 00	12 60	1,518 60
R. W. Cady	Assistant engineer	6 00 per day	1,356 00	142 11	1,498 11
J. S. Clancy	Assistant engineer	6 00 per day	132 00		132 00
Harry Shoemaker	Assistant engineer	6 00 per day	180 00		180 00
I. S. Matlaw	Assistant engineer	6 00 per day	240 00		240 00
M. W. Grimes	Assistant engineer	5 00 per day	200 00		200 00
Thomas R. Tetley, Jr.	Assistant engineer	6 00 per day	216 00	31 86	247 86
H. S. Sparr	Leveler	5 00 per day	1,330 00		1,330 00
E. A. Duschak	Leveler	5 00 per day	1,565 00		1,565 00
L. Lee Hadley	Leveler	5 00 per day	1,415 50	12 04	1,427 54
J. A. Glominski	Leveler	5 00 per day	937 00		937 00
D. A. Young	Leveler	5 00 per day	945 00		945 00
J. M. Prior	Leveler	4 50 per day	1,417 50		1,417 50
A. B. Cudebec	Leveler	4 50 per day	351 00		351 00
R. E. Drake	Leveler	4 50 per day	589 50		589 50
C. N. Swick	Leveler	4 50 per day	184 50		184 50
H. J. Stabile	Leveler	4 50 per day	1,156 50		1,156 50
S. D. Hendricks	Rodman	4 00 per day	228 00		228 00
C. H. Adams	Rodman	3 50 per day	211 00		211 00
R. G. Pratt	Rodman	4 00 per day	436 00	3 99	439 99
Paul S. L. Bulger	Rodman	3 50 per day	280 00		280 00
W. C. Stuart	Rodman	3 50 per day	294 00		294 00
C. S. Diets	Rodman	4 00 per day	44 00		44 00
Jesse F. Black	Rodman	3 50 per day	119 00		119 00
John Lyons	Rodman	3 50 per day	10 50		10 50
M. L. Babcock	Rodman	3 50 per day	248 50	1 34	249 84
H. D. Schult	Rodman	3 50 per day	126 00		126 00
Frank M. Kuchar	Rodman	3 50 per day	122 50		122 50
James Conley	Rodman	4 00 per day	56 00		56 00
H. L. Drake	Rodman	3 50 per day	350 00		350 00
L. E. Moyer	Rodman	3 50 per day	990 50		990 50
Frank Laybum	Chainman	3 00 per day	587 50		587 50
S. M. Messer	Chainman	2 50 per day	362 50		362 50
G. E. Deutschbein	Chainman	2 50 per day	167 50		167 50
L. J. Pfohl	Chainman	2 50 per day	90 00		90 00
T. C. Rolls, Jr.	Chainman	2 50 per day	65 00		65 00
A. A. Laughlin	Chainman	2 50 per day	135 00		135 00
William Branch	Chainman	2 50 per day	255 00		255 00
H. J. Scheuermann	Bridge designer	175 per month	262 50		262 50
H. G. Miller	Bridge designer	175 per month	17 50		17 50
C. H. Wood	Bridge designer	150 per month	58 33		58 33
J. C. Green	Bridge designer	175 per month	84 68		84 68
E. A. Brainerd	Bridge designer	175 per month	175 00		175 00
J. C. Podmore	Bridge designer	150 per month	222 58		222 58
I. S. Abrahams	Bridge draftsman	125 per month	37 50		37 50
J. A. Pritchard	Junior bridge draftsman	85 per month	382 50		382 50
Charles E. Quimby	Junior bridge draftsman	75 per month	91 45		91 45
J. J. Cosgrave, Jr.	Architectural draftsman	125 per month	314 52		314 52
J. A. Jensen	Mechanical draftsman	75 per month	23 33		23 33
L. D. Westfall	Engineering draftsman	5 00 per day	620 00		620 00
C. F. Hopstein	Engineering draftsman	5 00 per day		17 88	17 88
J. H. Stevens	Engineering draftsman	5 00 per day	700 00		700 00
J. H. McCormick	Engineering draftsman	5 00 per day	390 00		390 00
J. J. Ryan	Tracer	75 per month	20 13		20 13
Charles Messina	Tracer	75 per month	29 19		29 19
Leroy Bamer	Tracer	75 per month	211 94		211 94
T. L. Ainsworth	Tracer	75 per month	12 50		12 50
R. R. Murray	Tracer	75 per month	75 00		75 00
W. J. Henk	Tracer	60 per month	600 00		600 00
C. T. Kniskern, Jr.	Tracer	60 per month	48 39		48 39

Construction of Barge Canal — Cayuga and Seneca Canal — (Concluded).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
R. B. Allen	Tracer	$60 per month	$102 00		$102 00
H. Kramer	Foreman of borings	4 50 per day	553 50	$14 15	567 65
H. W. Stoneburg	Foreman of borings	4 00 per day	496 00	10 02	506 02
W. N. Dutcher	Inspector	5 00 per day	450 00		450 00
C. W. Diefendorf	Inspector	3 50 per day	42 00		42 00
Philip Steigman	Axeman	2 00 per day	240 00		240 00
Paul Kelley	Chauffeur	100 per month	100 00	8 00	108 00
M. H. McConnell	Boatman	3 00 per day	818 00		818 00
J. H. McCabe	Boatman	3 00 per day	687 00		687 00
J. L. Grogan	Boatman	3 00 per day	504 00		504 00
Thomas Redmond	Boatman	3 00 per day	288 00		288 00
C. G. McCarthy	Boatman	3 00 per day	18 00		18 00
Charles Sterling	Boatman	3 00 per day	27 00		27 00
J. A. Smith	Laborer	2 00 per day	386 00		386 00
William Marshall	Laborer	2 00 per day	130 00		130 00
P. J. Cullen	Laborer	2 00 per day	12 00		12 00
L. A. Cowing	Laborer	2 00 per day	12 00		12 00
W. D. Knapp	Laborer	2 00 per day	12 00		12 00
Thomas Welch	Laborer	2 00 per day	254 00		254 00
Steve Childs	Laborer	2 00 per day	326 00		326 00
Peter Woods	Laborer	2 00 per day	218 00		218 00
J. H. McCarthy	Laborer	2 00 per day	12 00		12 00
John Costigan	Laborer	2 00 per day	228 00		228 00
Henry Oaks	Laborer	2 00 per day	230 00		230 00
Bernard Kirk	Laborer	2 00 per day	244 00		244 00
James Thorne	Laborer	2 00 per day	190 00		190 00
John Marshall	Laborer	2 00 per day	208 00		208 00
Dean Davis	Laborer	2 00 per day	140 00		140 00
Peter McKevitt	Laborer	2 00 per day	244 00		244 00
J. H. McCabe	Laborer	2 00 per day	84 00		84 00
George A. Farrell	Laborer	2 00 per day	200 00		200 00
F. R. Ryan	Laborer	2 00 per day	90 00		90 00
Henry O'Connell	Laborer	2 00 per day	12 00		12 00
Leon Tunney	Laborer	2 00 per day	14 00		14 00
C. A. Haws	Laborer	2 00 per day	12 00		12 00
W. F. Macreery	Laborer	2 00 per day	12 00		12 00
J. M. Considine	Laborer	2 00 per day	12 00		12 00
W. H. Grover	Gage reader	10 00 per month	120 00		120 00
Edward Fitzgerald	Gage reader	7 00 per month	35 00		35 00
A. Demont	Gage reader	7 00 per month	42 00		42 00
Anna L. Greene	Gage reader	7 00 per month	38 73		38 73
George W. Graves	Gage reader	7 00 per month	70 00		70 00
James H. Clary	Gage reader	7 00 per month	2 94		2 94
Daniel Havens	Gage reader	7 00 per month	70 00		70 00
A. H. O'Reilly	Gage reader	7 00 per month	84 00		84 00
John Coffee	Gage reader	7 00 per month	14 00		14 00
Warren Van Ripper	Gage reader	7 00 per month	11 06		11 06
W. Van Kirk	Gage reader	5 00 per month	50 00		50 00
John Quail	Gage reader	5 00 per month	10 00		10 00
Frank Carter	Boat hire			311 50	311 50
D. M. Kellogg	Boat hire			296 50	296 50
Wm. Mansfield	Livery			20 50	20 50
			$42,102 40	$1,428 06	$43,530 46
Incidental Expenses.					
Instruments, tools and appliances				$110 55	
Stationery and printing				23 70	
Fuel and light				20 57	
Postage				31 26	
Office rent				416 24	
Telephone and telegraph				83 19	
Miscellaneous				2,066 89	
					2,752 40
Total					$46,282 86

Seneca Street Bridge, Utica.

Chapter 454, Laws of 1909.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
L. D. Brownell	Assistant engineer	$6 00 per day		$2 41	$2 41
Incidental Expenses.					
Miscellaneous				$0 60	60
Total					$3 01

Franklin Street Bridge, Syracuse.

Chapter 453, Laws of 1909.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
E. A. Brainerd	Bridge designer	$175 per month	$112 90		$112 90
A. G. Hayden	Bridge designer	175 per month	296 27		296 27
Harold Levy	Bridge designer	175 per month	118 55		118 55
John F. Blaise	Junior bridge designer	75 per month	117 00		117 00
L. D. Brownell	Assistant engineer	6 00 per day	822 00	$0 40	822 40
Carl F. Hopstein	Draftsman	5 00 per day	305 00		305 00
W. N. Dutcher	Inspector	5 00 per day	90 00	1 80	91 80
			$1,861 72	$2 20	$1,863 92
Incidental Expenses.					
Stationery and printing				$85 58	
Miscellaneous				151 00	
					236 58
Total					$2,100 50

Washington Street Bridge, Rome.

Chapter 522, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
J. M. C. Quarles de Quarles	Bridge designer	$175 per month	$53 23		$53 23
A. G. Hayden	Bridge designer	175 per month	195 70	$5 93	201 63
H. J. Scheuermann	Bridge designer	175 per month	22 58		22 58
J. Cyrus Podmore	Bridge designer	150 per month	67 74		67 74
I. S. Abrahams	Bridge draftsman	125 per month	40 32		40 32
James H. Dugan	Bridge draftsman	1,201 per year	16 45		16 45
E. Mercer Weiskotten	Draftsman	4 00 per day	44 00		44 00
Jerry J. Ryan	Tracer	75 per month	38 52		38 52
R. K. Sheldon	Leveler	5 00 per day	834 50	35 34	869 84
Don A. Wilcox	Rodman	3 50 per day	406 00		406 00
			$1,719 04	$41 27	$1,760 31
Incidental Expenses.					
Stationery and printing				$44 60	
Postage				3 25	
Telephone and telegraph				2 85	
Miscellaneous				117 09	
					167 79
Total					$1,928 10

Surveys for State Board of Claims.

Chapter 433, Laws of 1909.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Guy Moulton	First resident engineer	$250 per month	$225 00	$13 45	$238 45
D. E. Whitford	Assistant engineer	6 00 per day	1,554 00		1,554 00
L. D. Brownell	Assistant engineer	6 00 per day	264 00	89 34	353 34
E. J. Berry	Leveler	5 00 per day	35 00	9 58	44 58
C. F. Hopstein	Draftsman	5 00 per day	45 00		45 00
Clark H. Norton	Laborer	2 00 per day	54 00		54 00
			$2,177 00	$112 37	$2,289 37
Incidental Expenses.					
Livery				$19 00	
Miscellaneous				50	
					19 50
Total					$2,308 87

Black River Survey.

Chapter 190, Laws of 1911.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
Guy Moulton	First resident engineer	$250 per month	$100 00	$16 35	$116 35
Louis A. Burns	Assistant engineer	6 00 per day	210 00	183 32	393 32
R. W. Smith	Leveler	4 50 per day	225 00		225 00
Octave DeCarre	Rodman	3 50 per day	147 00		147 00
Chas. M. Chuckrow	Rodman	3 50 per day	199 50		199 50
Herbert M. Grow	Chainman	2 50 per day	112 50		112 50
John C. Cronin	Chainman	2 50 per day	115 00		115 00
Carleton J. Alley	Chainman	2 50 per day	112 50		112 50
John H. McManus	Foreman of borings	4 50 per day	94 50		94 50
Martin Rowan	Boatman	3 00 per day	147 00		147 00
Graydon Scott	Laborer	2 00 per day	80 00		80 00
Neil D. Hyde	Laborer	2 00 per day	128 00		128 00
Lemuel Dillenbeck	Laborer	2 00 per day	104 00		104 00
Gerald E. Cahill	Laborer	2 00 per day	106 00		106 00
			$1,881 00	$199 67	$2,080 67
Incidental Expenses.					
Livery				$44 00	
Stationery and printing				1 00	
Postage				1 57	
Office rent				8 50	
Miscellaneous				53 83	
					108 90
Total					$2,189 57

Mapping Canal Lands — (Blue Line Survey).

Chapter 199, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
E. C. Olcott	Assistant engineer	$6 00 per day	$1,878 00	$171 43	$2,049 43
Charles Montag	Rodman	3 50 per day	1,046 50		1,046 50
E. G. Warner	Chainman	2 50 per day	402 50		402 50
A. A. Vickers	Chainman	2 50 per day	815 00		815 00
John Shay	Boatman	3 00 per day	432 00		432 00
Earle Willis	Laborer	2 00 per day	588 00		588 00
W. M. Francis	Axeman	2 00 per day	20 00	4 56	24 56
E. C. Taylor				34 00	34 00
			$5,182 00	$209 99	$5,391 99
Incidental Expenses.					
Livery				$6 00	
Stationery and printing				2 21	
Fuel and light				21 45	
Postage				3 04	
Office rent				63 00	
Miscellaneous				161 12	
					256 82
Total					$5,648 81

SUMMARY.

The foregoing tables are summarized as follows:

Ordinary Repairs to Canals.

1. Erie canal, chapter 512, Laws of 1910	$8,562 24
2. Cayuga and Seneca canal, chapter 512, Laws of 1910	134 26
3. Oswego canal, chapter 512, Laws of 1910	53 50

Construction of Barge Canal.

4. Erie canal, chapter 147, Laws of 1903, and amendatory laws	146,326 89
5. Oswego canal, chapter 147, Laws of 1903, and amendatory laws	72,557 03
6. Cayuga and Seneca canal, chapter 391, Laws of 1909	46,282 86

Special Work.

7. Seneca street bridge, Utica, chapter 454, Laws of 1909	3 01
8. Franklin street bridge, Syracuse, chapter 453, Laws of 1909	2,100 50
9. Washington street bridge, Rome, chapter 522, Laws of 1910	1,928 12

Special Surveys.

10. Surveys for State Board of Claims, chapter 513, Laws of 1910	2,308 87
11. Black river survey, chapter 190, Laws of 1911	2,189 57
12. Mapping canal lands, chapter 199, Laws of 1911	5,648 81
Total	$288,095 66

TABLE OF CONTRACTS COMPLETED ON THE MIDDLE DIVISION DURING THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Special Work.

CONTRACTOR.	Date of contract.	Character of work.	Act.		Appropriation.	Engineer's preliminary estimate.	Contract price.	Final payment.
			Chap.	Year.				
N. D. Peters Co	Nov. 19, 1909	Seneca street bridge, Utica	454	1909	$24,000 00	$15,473 50	$15,992 75	$18,596 47
H. Tosh & Son	Dec. 27, 1910	Washington street bridge, Rome	522	1910	20,000 00	15,486 00	14,777 50	14,738 32

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Final payment.
Empire Engineering Corporation	April 18, 1905	Contract No. 4, Erie canal — The 4¼ miles east of Oneida lake	$812,560 00	$726,779 75	$720,072 76
Scott Brothers	May 6, 1908	Contract No. 45, Erie canal — Through Baldwinsville; Caughdenoy dam	425,124 00	472,802 35	418,651 93
Scott Brothers	Aug. 16, 1909	Contract No. 53, Oswego canal — Through Phoenix	200,500 00	167,585 00	164,575 52

TABLE OF CONTRACTS PENDING ON THE MIDDLE DIVISION SEPTEMBER 30, 1911.

Special Work.

CONTRACTOR.	Date of contract.	Character of work.	Act.		Engineer's preliminary estimate.	Contract price, as affected by alterations.	Payments to September 30, 1911.
			Chap.	Year.			
Cunningham-Woodard Co	June 15, 1910	Raising highway at contract No. 78, near Fulton	13	1909		$15,936 90	$9,981 00
Cunningham-Woodard Co	Nov. 28, 1910	Highways adjacent to Delta reservoir	453	1909		43,938 00	23,121 00
Chas. B. Foster	Dec. 3, 1910	Franklin street bridge, Syracuse	527	1910	$43,131 75	38,245 75	12,726 00

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws; Chapter 391, Laws of 1909.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work done to September 30, 1911.
E. J. Doyle & Co	Dec. 8, 1910	Contract No. 4-B, Erie canal — Concrete highway bridge along Burdick's road	$1,353 10	$1,385 12	$1,310 00
Empire Engineering Corporation	April 18, 1905	Contract No. 5, Erie canal — Mosquito Point to Fox Ridge	421,252 00	375,871 57	125,820 00
McDermott Contracting Co	June 7, 1906	Contract No. 10, Oswego canal — Through Fulton	1,149,988 00	1,111,964 57	668,360 00
James Stewart & Co	Sept. 23, 1907	Contract No. 12, Erie canal — Oneida lake to Mosquito Point	3,082,560 00	3,548,817 19	2,120,830 00
Penn Bridge Co	Nov. 7, 1908	Contract No. 13, Erie canal — Bridges on part of contract No. 12	17,471 50	17,955 30	10,250 00
M. Fitzgerald	Sept. 24, 1910	Contract No. 22, Erie canal — Bridges on part of contract No. 12	107,126 00	117,194 50	14,960 00
Penn Bridge Co	Jan. 7, 1910	Contract No. 33, Oswego canal — Lock-gates, etc., on contract No. 10	46,463 24	50,386 89	24,890 00

Gilmour-Horton-Allen Co	Sept. 16, 1907	Contract No. 35, Oswego canal — Through Oswego	752,760 00	722,501 67	433,810 00
Henry P. Burgard	Dec. 9, 1910	Contract No. 37, Oswego canal — Between Fulton and Oswego	1,992,220 00	2,323,958 50	607,840 00
James Stewart & Co	April 15, 1910	Contract No. 39, Oswego canal — Between Three River Point and Fulton	972,900 00	1,048,674 40	130,600 00
Shanley-Morrissey, Inc	July 9, 1909	Contract No. 42, Erie canal — Herkimer-Oneida county line to Oriskany road	1,312,814 00	1,043,314 85	441,270 00
M. A. Talbot Co	Oct. 15, 1909	Contract No. 43, Erie canal — Oriskany road to Mud creek	1,529,885 00	1,362,869 50	86,960 00
Scott Brothers	Jan. 8, 1910	Contract No. 44, Erie canal — Mud creek to contract No. 4	1,926,093 00	1,721,518 00	587,070 00
Kinser Construction Co	Nov. 23, 1908	Contract No. 46, Erie canal — Fox Ridge to Galen town line	1,367,583 00	1,221,278 80	605,960 00
Buffalo Dredging Co	Sept. 23, 1910	Contract No. 50, Water-supply — Dam, waste-gates and spillway at Hinckley	1,076,000 00	963,415 00	76,220 00
Alto Construction Co	Dec. 23, 1910	Contract No. 51, Water-supply — Feeder between Trenton Falls and Nine-Mile creek	424,710 00	389,842 50	56,650 00
Arthur McMullen	Oct. 19, 1908	Contract No. 55, Water-supply — Delta reservoir	1,014,525 00	929,836 00	815,800 00
Cunningham-Woodard Co	Aug. 18, 1910	Contract No. 73, Oswego canal — Dike along Oswego river near Fulton	55,154 00	49,025 95	46,360 00
Lupfer & Remick	Sept. 23, 1910	Contract No. 79, Oswego canal — Bridge street bridge at Oswego	39,735 00	27,480 00	20,950 00
Walter Bradley	Jan. 16, 1911	Contract No. 80, Oswego canal — Dam and bulkheads at Phoenix	134,340 00	117,390 64	53,030 00
Lupfer & Remick	Aug. 5, 1911	Contract No. 85, Oswego canal — Lift-bridge over lock No. 1 at Phoenix	12,783 50	13,238 50	500 00
D'Olier Engineering Co	April 12, 1910	Contract No. 90, Erie and Oswego canals — Power-supply: Erie canal, lock No. 24, and Oswego canal, locks Nos. 1, 2, 7 and 8	86,536 35	88,006 41	48,160 00
Scott Brothers	Dec. 30, 1910	Contract A, Cayuga and Seneca canal — Lock No. 1 and dam No. 1 near Cayuga	393,133 50	357,627 00	82,450 00
Crowell-Sherman-Stalter Co	Dec. 29, 1910	Contract B, Cayuga and Seneca canal — Dredging, Montezuma to deep water in Cayuga lake, Cayuga lake to Seneca Falls, Waterloo to Seneca lake	1,832,550 00	1,448,550 00	349,600 00

EXTRA AND UNSPECIFIED WORK ORDERS PAID TO SEPTEMBER 30, 1911.

CONTRACT No.	Date of order.	Amount.	Total.
4	April 24, 1907	$1,257 29	
4	May 20, 1909	281 34	
4	June 4, 1909	399 22	
4	Aug. 30, 1909	7,635 64	
4	Nov. 18, 1909	62 65	
4	May 24, 1910	2,948 31	
			$12,584 45
7	May 10, 1909	$3,143 17	
			3,143 17
10	April 24, 1908		
	Feb. 1, 1911	$821 10	
			821 10
12	Jan. 23, 1909	$328 51	
			328 51
33	July 14, 1911	$302 13	
			302 13
35	Oct. 2, 1908	$760 95	
35	Sept. 20, 1910	150 00	
			910 95
45	Dec. 15, 1908	$68 71	
45	Aug. 5, 1909	480 20	
45	Oct. 29, 1909	317 97	
			866 88
53	April 18, 1911	$236 38	
53	May 3, 1911	876 76	
			1,113 14
55	Dec. 29, 1910	$405 30	
			405 30
78	Sept. 3, 1910	$51 10	
			51 10
90	June 15, 1910	$560 69	
			560 69
Total			$21,087 42

REPORT

OF THE

DIVISION ENGINEER

OF THE

WESTERN DIVISION

For the Fiscal Year Ended September 30, 1911

WESTERN DIVISION.

STATE OF NEW YORK,

DEPARTMENT OF STATE ENGINEER AND SURVEYOR,

WESTERN DIVISION.

ROCHESTER, N. Y., *October* 2, 1911.

Hon. JOHN A. BENSEL, *State Engineer and Surveyor, Albany, N. Y.:*

Sir.— I have the honor of submitting herewith my annual report as Division Engineer of the Western Division, for the fiscal year ended September 30, 1911.

The Western Division comprises that part of the existing canal system of the State extending from the east line of Wayne county to the westerly line of Main street, in the city of Buffalo, covering a total of 147.88 miles of navigable waters. For Barge canal construction the division limits are substantially the same, but construction work terminates at the Niagara river at Tonawanda.

The principal work of this division has consisted in performing the necessary engineering work in connection with the existing Erie canal, making surveys, plans and estimates and supervising the construction of the Barge canal under chapter 147, Laws of 1903, and amendments thereto.

Coöperation has been extended and assistance given to the Department of Public Works in making plans, surveys and estimates and also appropriation maps, when required.

Surveys and maps have been made and testimony given on behalf of the State before the Board of Claims and in suits brought against the State for damages on account of canal construction.

Due credit should be given the Department of Public Works and also to the contractors and engineers of this Department, for

their able coöperation to secure the safety of canal embankment and structures.

The bridge at Georgia street, in the city of Buffalo, was completed during the last fiscal year.

The details of contracts completed and in force are herewith appended.

CONTRACTS COMPLETED DURING THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

GEORGIA STREET BRIDGE, BUFFALO.

(Chapter 452, Laws of 1909.)

Contract dated, January 29, 1910.

Contract to be completed, July 1, 1910.

Contractors, Lupfer & Remick, Buffalo, N. Y.

Total appropriation	$19,500 00
Engineer's estimate	17,268 00
Contract price	18,121 00
Final estimate	17,164 70

This is a fixed bridge, constructed over the existing Erie canal at Georgia street in the city of Buffalo. The plans were adopted by the Canal Board, October 27, 1909, for an overhead, steel, Platt truss bridge, having a length of 177 ft. 2¾ in., center to center of end pins, a total roadway of 179 ft. 3⅝ in. and a total length of pavement of 181 ft. 2⅝ in., with a clear width of roadway 18 ft. 10 in. There are no sidewalks on the bridge, the floor beams being fabricated with a view of attaching sidewalks in the future.

The bridge floor is composed of nailing strips with 4-inch creosoted planking, surfaced with 3½-inch creosoted wood block pavement, making a total thickness of floor of 7½ inches.

The bridge is supported at the west end by the original stone masonry abutment, taken down to a certain elevation, then reinforced on the face and capped with second-class concrete. The east end is supported by a new concrete abutment built on the old pile foundation, reinforced with 41 new piles.

Work was commenced about February 1, 1910, but owing to a strike of the laborers during the construction of the substructure and also to delay in connection with the superstructure, the work was not completed within the time limit set forth in the contract, but was completed in November, 1910.

BARGE CANAL.

(Chapter 147, Laws 1903.)

For the purpose of carrying on the Barge canal work, the Western Division is divided into the following residencies:

Erie Canal Residency No. 8. From the easterly line of Wayne county, at the southeast corner of the town of Galen, to the westerly line of Wayne county, one-half mile west of the village of Wayneport, Wayne county. B. E. Failing, Resident Engineer, in charge, with office at Lyons, N. Y.

Erie Canal Residency No. 9-A. From the westerly line of Wayne county to the Genesee river, following the route of the present Erie canal to King's Bend, near Pittsford, and thence by a land line to the Genesee river. O. F. Bellows, Resident Engineer, in charge, with office at Rochester. On March 1, 1911, Residencies Nos. 9-A and 9-B were consolidated, and H. J. Knoppel, Resident Engineer, placed in charge.

Erie Canal Residency No. 9-B. By way of a land line from the Genesee river south of Rochester to South Greece and thence along the present Erie canal to the westerly line of Monroe county, about three miles west of the village of Brockport. Thos. J. Morrison was in charge of this Residency until October 15, 1910, when he resigned, and H. J. Hemstreet, Assistant Engineer, took charge until Residencies Nos. 9-A and 9-B were consolidated, and H. J. Knoppel, Resident Engineer, took charge of same, with offices at Rochester.

Erie Canal Residency No. 10-A. From the westerly line of Monroe county to a point 100 feet east of Gasport bridge, in the village of Gasport, Niagara county. Chas. A. Ingersoll, Resident Engineer, was in charge of this residency until February 1, 1911, when he resigned. J. V. Hogan, Resident Engineer, was placed in charge on March 14, 1911, and has had charge up to the present time, with offices at Medina, N. Y.

Erie Canal Residency No. 10-B. From a point 100 feet east of Gasport bridge to the head of the present guard-lock, near the village of Pendleton, Niagara county.

Erie Canal Residency No. 11. From the head of the guard-lock near the village of Pendleton, Niagara county, to the Niagara river at Tonawanda. C. J. McDonough, Resident Engineer, has charge of both Residencies 10-B and 11, with offices at Lockport.

Contracts Nos. 6, 9 and 41 were completed during the past fiscal year. Generally speaking, the rate of progress on all contracts on the Western Division has been satisfactory.

The reports of the several resident engineers, giving in detail the work done during the fiscal year ended September 30, 1911, on their respective residencies, follow:

ERIE CANAL, RESIDENCY No. 8.

Resident Engineer B. E. Failing reports:

"Residency No. 8 embraces the entire length of the Barge canal through Wayne county and extends from the easterly line of the county, at the southeast corner of the town of Galen, to the westerly line, about one-half mile west of the village of Wayneport, Wayne county. This residency is divided into seven contracts, viz., Nos. 47, 48, 76, 77, 84, 89 and 49.

"*Contract No.* 47.

"This contract extends from the southeast corner of the town of Galen, at Sta. 5729 + 79, to a point near the N. Y. C. & H. R. R. R. crossing at Lyons, at Sta. 6510 + 00, a distance of 14.46 miles. D. E. Bellows, Assistant Engineer, has been in charge.

"This contract was let to the Crowell and Sherman Company of Cleveland, Ohio, on November 30, 1908, and assigned soon after to the Crowell–Sherman–Stalter Company. The contract calls for completion by May 20, 1912.

"The hydraulic dredge *Clyde,* excavating from the prism, worked from Sta. 6316 + 00 to Sta. 6377 + 80, at which point it suspended operations on November 29, 1910, and returned to Clyde, where it commenced work in the prism at Sta. 6081 + 00 about December 5, 1910, and worked east to Sta. 6050, cutting flotation only for the greater part of the distance. At Sta. 6050 work was suspended on February 28 and the dredge, after being overhauled, was removed from contract No. 47 on March 13, 1911. No prism excavation has been taken out since that date. A total of 645,760 cu. yds. of prism excavation was taken out during the year, leaving 1,631,140 cu. yds. of material (mostly hard) to be removed.

"The front levees were built with a Browning excavator, carrying a 1½-yard bucket. This excavator worked west to Sta. 6400, where it was dismantled and removed from contract No. 47.

"Under supplementary agreement the Sodus street bridge at Clyde was removed about February 1, 1911, to allow the passage of the dredge *Clyde.* After the piers were removed the bridge was replaced on timber cribs, about February 24.

"About March 1 the Glasgow street bridge at Clyde was removed and all traffic diverted over the Sodus street bridge.

"At Creager's bridge the excavation for the approach has been partly done by teams and scrapers, 1,498 cu. yds. having been taken out.

"All the structures on this contract have been completed, with the exception of lock No. 26 and the dam at that point.

"At lock No. 26 the contractors have placed 3,877 cu. yds. of second-class concrete in the lock and approach walls, leaving 12,818 cu. yds. to be placed in the lock proper and dam. All excavation for the lock and approach walls is complete. No work has been done on the dam.

"The following is a table showing the percentage of work done during the fiscal year and to date, as affected by all alterations:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	225	0	250	0	111.1
Grubbing.....cu. yds.	890	46	600	5.2	67.4
Excavation.....cu. yds.	5,309,550	665,773	3,129,258	12.5	58.9
Sheeting and bracing.....ft. B. M.	25,000	0	28,000	0	112
Forming embankment.....cu. yds.	31,950	7,719	11,849	24.1	37
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	4,000	0	2,500	0	62.5
Foundation piles.....lin. ft.	4,200	1,940	5,755	46.2	136.9
Wooden sheet-piling.....ft. B. M.	7,000	0	5,000	0	71.4
Second-class concrete.....cu. yds.	23,689	3,877	10,871	16.4	45.9
Reinforced concrete.....cu. yds.	113	0	107	0	94.7
First-class masonry bridge coping.....cu. yds.	2	0.65	1.65	32.5	82.5
Second-class stone paving.....sq. yds.	50	0	36	0	72
Second-class riprap.....cu. yds.	860	0	11	0	1.3
15-inch vitrified pipe.....lin. ft.	865	0	786	0	90.8
Trenching and backfilling.....lin. ft.	865	0	786	0	90.8
Structural steel.....lbs.	158,100	1,150	141,041	1	89.2
Metal reinforcement.....lbs.	24,500	4,478	15,916	18.3	65
Wrought iron.....lbs.	2,425	349	701	14.4	28.9
Iron castings, machined.....lbs.	6,600	1,590	3,180	24.1	48.2
Wood pavement.....sq. yds.	330	47	322	14.2	97.6
Metal in buffer-beams.....lbs.	90,000	4,362	4,686	4.8	5.2
Metal in lock-gates.....lbs.	180,000	299	299	0.2	0.2
Removal of Glasgow st. and Sodus st. bridges, and reconstruction and maintenance of Sodus street bridge.....lump sum	$100	$100	$100	100	100
Gross estimate.....	$1,286,287	$167,030	$720,590	13	56.1

"Contract No. 84.

"This contract consists of the construction of two lift bridges across the Barge canal at Glasgow and Sodus streets, Clyde. Work on the plans has been suspended, pending an investigation of a proposition to eliminate the grade crossings of the New York Central and the West Shore railroads at that point.

"Contract No. 48.

"This contract extends from a point near the New York Central and Hudson River railroad crossing at Lyons, Sta. 6510, to a point near the West Shore railroad crossing at East Newark, Sta. 6813, a distance of 5.75 miles. F. W. Madigan, Assistant Engineer, is in charge of construction.

"This contract was let December 29, 1910, to the Crowell–Sherman–Stalter Company. The contract calls for completion January 1, 1914.

"Work was started on April 11, 1911. The Crowell–Sherman–Stalter Company have built a 20-inch, steel hull, suction dredge and started a large dipper dredge, which is about 85 per cent completed.

"In the prism west of Sta. 6682 + 00, a 70-ton Marion steam-shovel and a Browning excavator, carrying a 2½-yard bucket, have been installed, which, with the dump trains, have excavated from prism and built embankment between Stas. 6682 and 6732, a total of 66,582 cu. yds. of excavation and 42,668 cu. yds. of embankment. The balance of the material was placed in spoil banks and in the approach of the bridge at Sta. 6701.

"At Geneva street, Lyons, the contractors have installed a McMyler crane, carrying a 1½-yard bucket, and a Vulcan pile driver with a 3,000-lb. steam hammer. Steel sheeting to the amount of 12,490 sq. ft. has been driven and 2,695 cu. yds. of excavation taken out. At this point a temporary bridge is being built to take care of traffic during the building of the Geneva street bridge. A temporary bridge is also under construction across the Canandaigua outlet at Forgham street, for the purpose of diverting traffic around by Geneva street, when the Leach road is closed.

"At lock No. 28-A work was started promptly. A Mosby excavator, carrying a 1½-yard clam-shell bucket, was installed and has excavated from the site of the upper approach wall 2,034 cu. yds. of material. A Williams excavator with an 87-foot boom, carrying a 2½-yard Page bucket, was installed at the site of the lock proper and has taken out 2,107 cu. yds. of material.

"A complete plant for mixing and handling concrete has been installed, including a Ransome ½-yard mixer, buckets, dinky trains, etc. Concrete work was started at the upper approach the first week in September and 1,135 cu. yds. have been placed to date.

"The abutments for the highway bridge at Sta. 6701 have been started and about 1,125 cu. yds. of concrete placed.

"The dive culvert and spillway near Sta. 6710 are under way and 4,140 cu. yds. of excavation have been taken out at those points.

"The following table shows the percentage of work done during the fiscal year and to date on contract No. 48:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	67	40	40	59.7	59.7
Excavation.....cu. yds.	2,002,500	80,265	80,265	4	4
Sheeting and bracing.....ft. B. M.	193,000	15,000	15,000	7.8	7.8
Embankment.....cu. yds.	276,000	43,980	43,980	15.9	15.9
Foundation piles.....lin. ft.	38,500	40	40	1	1
Second-class concrete.....cu. yds.	30,100	159	159	0.5	0.5
Wash wall.....cu. yds.	59,140	2,260	2,260	3.8	3.8
Steel piling, first quality.....sq. ft.	240,000	12,490	12,490	52	52
Maintaining highway traffic lump sum	$1,500	15%	15%	15	15
Coffer-dams, pumping, bailing and draining, lump sum	$24,000	2%	2%	2	2
Gross estimate.....	$1,701,672 50	$75,970	$75,970	4.5	4.5

"Contract No. 76.

"This contract extends from a point near the West Shore railroad crossing at East Newark, Sta. 6813, to a point about half a mile east of Port Gibson, Sta. 7045, a distance of 5.77 miles.

"This contract was let to the T. A. Gillespie Company of New York, on December 23, 1910, and calls for completion by December 23, 1913. Mr. C. D. Murray, Assistant Engineer, is in charge.

"The contractor started the erection of buildings and plant, February 1, 1911. The first construction work was done, February 20, 1911.

"A Marion, Model No. 60, 70-ton steam-shovel and a 15-ton Brown-hoist crane were installed in the prism at the east end of the contract, and completed the prism excavation between lock No. 28-B and the Erie canal at the east end of the contract, removing 274,404 cu. yds. of material. Excavation for lock No. 28-B, amounting to 76,441 cu. yds., was also completed.

"A similar shovel was installed west of Allerton's highway and has taken from the prism between Sta. 6872 and the west end of the contract 203,609 cu. yds. of excavation, from which 35,353 cu. yds. of embankment has been built. Under alteration No. 3 to this contract, 149,000 ft. B. M. of wooden sheeting has been driven under the embankment at the west end.

"At lock No. 28-B a complete concrete mixing and handling plant has been erected, including a large Hains mixer. 9,560 cu. yds. of second-class concrete have been placed in the lock proper and 2,074 cu. yds. in the lower approach walls, under alteration No. 2.

"The work of excavating the prism along the Erie canal between Main street and Allerton's bridge was stopped to avoid endangering the embankment of the present Erie canal.

"The following table shows the percentages of work done during the fiscal year and to date on this contract:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	2,137,990	511,399	511,399	23.9	23.9
Embankment.....cu. yds.	164,500	35,353	35,353	21.5	21.5
Wooden sheet-piling.....ft. B. M.	479,400	149,000	149,000	31	31
Second-class concrete.....cu. yds.	36,550	11,634	11,634	31.8	31.8
Structural steel.....lbs.	39,100	3,728	3,728	9.5	9.5
Metal reinforcement.....lbs.	37,900	6,092	6,092	16.1	16.1
Iron castings, plain.....lbs.	18,100	640	640	3.5	3.5
Iron castings, machined.....lbs.	6,900	3,280	3,280	47.5	47.5
Coffer-dams, pumping, bailing and draining, lump sum	$12,000	20%	20%	20	20
Gross estimate.....	$1,512,011	$353,260	$353,260	23.6	23.6

"Contract No. 77.

"This contract extends from a point about one-half mile east of Port Gibson, Sta. 7045, to about one-half mile west of Palmyra, Sta. 7400, a distance of 6.78 miles. B. L. G. Rees, Assistant Engineer, has been in charge.

"This contract was let December 23, 1910, to the T. A. Gillespie Company, of New York city. The contract calls for completion May 1, 1913. Work was started January 23, 1911, when the installation of plant and equipment commenced. On February 18, 1911, a Marion, Model 60, steam-shovel started excavating from the site of lock No. 29.

"In the prism east of Galloway's bridge two Model No. 60 steam-shovels were installed March 1, 1911, but on May 2 one of them was removed to contract No. 76. The remaining shovel

was worked in the prism and at the guard-gate, between Stas. 7121 + 80 and 7177 + 75, and has taken out 374,338 cu. yds. of material.

"A 20-in. hydraulic dredge was built and started operations July 6, 1911, at Sta. 7366 and has worked east to Sta. 7339 + 50. Owing to boulders and other bad material the dredge has made poor progress, having taken out a total of 98,111 cu. yds.

"A Lidgerwood traveler, carrying a 1-yard bucket, has been installed and used for excavating in prism, new creek channels and bridge abutments, having removed 37,874 cu. yds. from the prism between Stas. 7285 + 50 and 7325.

" The work on the new creek channels has been done by the Lidgerwood, which has taken out 19,113 cubic yards.

"At lock No. 29 the first work was done on February 23, 1911, by the Marion shovel No. 8, which started the excavation for lower approach walls and lock proper. A complete plant for mixing and handling concrete, including a large size Hains mixer, was installed. The lock excavation having been completed (43,550 yds.), the first concrete was placed July 19, 1911, and concreting has progressed rapidly since that time. A total of 13,542 cu. yds. has been placed in the lock to October 1, 1911.

" Good progress has been made on the other smaller structures. The abutments of Maple avenue and Limerick street bridges are completed; the north abutment of Railroad avenue bridge is complete and the south abutment is under way. The excavation is well under way for the dock at Palmyra. Concrete work at Barnard's by-pass is practically completed and the excavation for the guard-gate at Sta. 7160 is complete. Nothing has as yet been done at Galloway's bridge or the Port Gibson bridge.

" The following quantities of concrete and excavation have been allowed in the smaller structures:

STRUCTURE.	Concrete.	Excavation.
	Cu. yds.	*Cu. yds.*
Maple avenue bridge	1,667	3,704
Limerick street bridge	1,883	3,096
Railroad avenue bridge	981	2,754
Barnard's by-pass	80	978
Palmyra dock	00	4,817



BARGE CANAL, CONTRACT No. 49.
View showing progress in constructing lock No. 30, near Macedon.

"The following table shows the percentages of work done during the fiscal year and to date on this contract:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	70	21	21	30	30
Excavation.....cu. yds.	2,629,110	667,007	667,007	25.4	25.4
Sheeting and bracing.....ft. B. M.	44,000	6,200	6,200	14.1	14.1
Embankment.....cu. yds.	194,480	30,911	30,911	15.9	15.9
Foundation piles.....lin. ft.	35,500	4,946	4,946	13.9	13.9
Second-class concrete.....cu. yds.	43,930	18,154	18,154	41.3	41.3
Reinforced concrete.....cu. yds.	390	40	40	10.3	10.3
Structural steel.....lbs.	701,840	2,153	2,153	0.3	0.3
Metal reinforcement.....lbs.	54,700	5,072	5,072	9.3	9.3
Steel castings.....lbs.	3,300	2,860	2,860	86.6	86.6
Maintaining highway traffic.....lump sum	$2,500	20%	20%	20	20
Coffer-dams, pumping, bailing and draining, lump sum	$11,000	47.5%	47.5%	47.5	47.5
Gross estimate.....	$1,648,875 50	$412,600	$412,600	25	25

"Contract No. 49.

"This contract extends from a point 500 feet east of Yellow Mills bridge to the Wayne–Monroe county line, a distance of 6.8 miles. H. N. Metzger, Assistant Engineer, has been in charge.

"This contract was let February 26, 1910, to the Bellew and Merritt Company. The contract calls for completion by May 1, 1912.

"The clearing on this contract is completed, 85 acres having been cleared during the past year. The big Lidgerwood excavator, carrying a 2½-yard bucket, has been working in the prism east of Macedon and has taken out 216,923 cu. yds. of material. In addition to the big excavator a 70-ton McMyler Interstate excavator, carrying a 1½-yard bucket, has been working at the east end of the contract, taking out 26,244 cu. yds. of material. Three Williams' travelers, building levees for spoil banks, have taken out from the prism 71,770 cu. yds. of material.

"From Sta. 7545 + 93 to Sta. 7702 + 50, 1,462,000 ft. B. M. of triple-lap sheet-piling has been driven under the north embankment during the year and 1,940 cu. yds. of wash wall laid.

"At lock No. 30 and approaches a complete mixing and handling equipment, including a Ransome 1-yard mixer, has been installed. The excavating plant consists of a 40-ton Marion shovel, Model

No. 20, in the lock site, and a 70-ton Bucyrus shovel in the lower approach. This plant has taken from the site of the lock and approaches 35,796 cu. yds. of material. Second-class concrete to the amount of 5,268 cu. yds. has been placed in the lock proper and 3,881 cu. yds. in the upper approach.

"Work on the smaller structures has been progressed satisfactorily. The Yellow Mills bridge is complete, except the south approach, and the substructure is complete at Frear's bridge. At Wayneport the south abutment is nearly complete.

"The highway culverts at Macedon, Frear's and Wayneport are complete.

"The following quantities of concrete and excavation have been done during the year in the small structures:

STRUCTURE.	Excavation.	Second-class concrete.
	Cu. yds.	*Cu. yds.*
Yellow Mills bridge	2,258	1,030
Frear's bridge	1,147	978
Wayneport bridge	1,403	192
Highway culverts	3,191	78

"The following table shows the percentages of work done during the fiscal year and to date on this contract:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....acres	220	85	202	38.6	91.9
Excavation.....cu. yds.	1,543,600	396,717	511,391	25.7	33.1
Sheeting and bracing.....ft. B. M.	260,000	27,000	27,000	10.4	10.4
Lining.....cu. yds.	3,130	9	9	0.3	0.3
Sawed lumber, yellow pine or Douglas fir.ft. B. M.	20,000	2,000	2,000	10	10
Foundation piles.....lin. ft.	18,400	6,310	6,310	34.3	34.3
Wooden sheet-piling.....ft. B. M.	1,420,000	1,462,000	1,462,000	103	103
Second-class concrete.....cu. yds.	31,250	11,427	11,450	36.5	36.6
Reinforced concrete.....cu. yds.	250	64	100	25.6	40
Wash wall.....cu. yds.	29,100	1,940	1,940	6.7	6.7
Second-class stone paving.....sq. yds.	680	43	43	6.3	6.3
Structural steel.....lbs.	480,100	97,375	97,375	20.3	20.3
Metal reinforcement.....lbs.	28,400	5,555	6,890	19.6	24.3
Wooden pavement, 2½ inches thick.....sq. yds.	960	263	263	27.4	27.4
Removing old bridge superstructures..lump sum	$200	$200	$200	100	100
Maintaining highway traffic.....lump sum	$2,000	32%	37%	32	37
Coffer-dams, pumping, bailing and draining, lump sum	$6,000	7%	7%	7	7
Gross estimate.....	$750,688	$240,250	$270,720	32	36.1



BARGE CANAL, CONTRACT NO. 63.
View of a hydraulic dredge operated by electric power.



BARGE CANAL, CONTRACT NO. 63.
View showing progress in constructing a pipe culvert at Thomas creek.

ERIE CANAL, RESIDENCY NO. 9.

Resident Engineer H. J. Knoppel reports:

"This residency includes the entire Barge canal improvement within the limits of Monroe county, a distance of approximately 40 miles, and includes contracts Nos. 63, 38, 41, 23, 59, 21, 82, 6, 60 and 61 and a portion of 75. The total amount under contract, including completed contracts, is $8,986,981.11. Total done to September 30, 1911, $4,779,594.04. Total earned during year, $1,966,154.86.

"The preliminary work was practically completed previous to the last report, the remainder of the appropriation surveys having been made this past year.

"Of the contracts within this residency, No. 38 has previously been reported as completed; contract No. 41 was completed early in 1911 and contract No. 6 was completed in September, 1911. Contract No. 59, for canalizing a portion of the Genesee river, has not been let and contract No. 75, for constructing guard-gate superstructures within the limits of contracts Nos. 60 and 61, has been awarded, but actual work has not been begun.

"Construction work on the remaining contracts has proceeded satisfactorily as follows:

"Contract No. 63.

"This contract provides for the improvement of the Erie canal from the west line of Wayne county to the east end of contract No. 23 at King's Bend, a distance of 12.22 miles. G. M. Briggs and C. R. Waters, Assistant Engineers, have been in charge of the Fairport section, extending to Bushnell's Basin bridge, and E. P. Strowger, Assistant Engineer, has been in charge of the Pittsford section.

"This contract was let to H. S. Kerbaugh, Inc., of Philadelphia, Pa., on June 13, 1910.

"An electrically operated hydraulic dredge, the *Fairport,* was constructed in the bed of the old canal east of Fairport during the winter of 1910–1911 and floated when the canal was filled for the opening of navigation in May, 1911. During the past season considerable time was lost by the dredge on account of lateness in starting operations, limbering up the machinery and other causes,

so that the output to September 30, 1911, was not up to expectations. A Lidgerwood excavator, with 70-foot boom and 1½-yard drag-line bucket, worked practically continuously from October 21, 1910, building the front dikes of spoil banks with material taken from the south side of prism. A traveling derrick with clam-shell bucket worked during the summer of 1911, building levees for dredge spoil banks. Another home-made excavator, with special type of clam-shell bucket rigidly attached to a heavy boom, has been used to excavate a new channel for Thomas creek. This machine was used where the excavation extended into a ledge of soft shale rock and proved to be an economical method of handling this material.

"On the Pittsford section of this contract one 20-ton and three 70-ton steam-shovels with the necessary attendant plant of locomotive and dump cars were used during the winter and spring up to the opening of navigation, excavating in the prism in the vicinity of Pittsford.

"A break occurred in the northerly berme bank of the canal on this contract at four o'clock in the afternoon of May 19, washing out about 100 feet of bank. The break occurred at Station 2080, just west of the overhead bridge at Bushnell's Basin. The water was drawn from the canal while the break was repaired and was let in again on June 11. Navigation was resumed on June 13, when the water was up to the level.

"As a majority of the structures on this contract are culverts and bridges, requiring comparatively small amounts of concrete masonry, the concrete plant has consisted of several separate units of portable mixers of from one-half to two-third cubic yard capacity, with charging hoppers hinged to mixers and hoisted to dumping position by steam power operating the mixer. They have given satisfactory results. At the concrete trough, however, on the fill at Irondequoit creek, a large stationary plant was erected and in conjuction with the use of collapsible steel forms, this work has been carried on very expeditiously during the past summer.

"Culverts Nos. 26, 27, 29 and 31 have been completed, as well as the Pittsford dock wall, Cartersville waste-weir, abutments for Knapp's, Cobb's, Fullam's Basin, Bushnell's Basin, Mitchell's and State and Main street bridges at Pittsford, and superstructures



BARGE CANAL, CONTRACT NO. 63.

View from about 100 feet east of the break in the canal bank near Bushnell's Basin, showing steel sheet-piling used in making repairs.

for Cobb's and State street bridges, besides portions of other structures. In addition to this a considerable amount of wash wall has been completed, a long stretch of the tow-path covered with lining and a new outlet ditch from the Cartersville waste-weir excavated and paved with third-class sheet concrete in lieu of second-class stone paving.

"The following is a table showing the amounts and percentages of work done during the year and total to end of fiscal year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dam, pumping, etc....miles	12.22	5.77	5.77	47.2	47.2
Clearing....lump sum	$1,000	$395	$700	39.5	70.0
Excavation....cu. yds.	2,780,860	894,376	931,085	32.2	33.5
Sheeting and bracing....ft. B. M.	85,000	44,919	44,919	52.8	52.8
Round timber bracing....lin. ft.	500	0	0	0	0
Channeling....sq. ft.	20,000	0	0	0	0
Forming embankment....cu. yds.	334,470	158,084	163,396	47.3	48.8
Lining....cu. yds.	31,366	5,218	5,218	16.6	16.6
Puddle....cu. yds.	8,200	53	53	0.65	0.65
Sawed lumber, yellow-pine or Douglas fir.ft. B. M	44,000	11,181	11,181	25.4	25.4
Creosoted lumber....ft. B. M.	22,000	0	0	0	0
Foundation piles....lin. ft.	17,690	681	681	3.8	3.8
Wooden sheet-piling....ft. B. M.	45,000	0	0	0	0
Second-class concrete....cu. yds.	58,460	20,935	20,935	35.8	35.8
Third-class concrete....cu. yds.	6,350	935	935	14.7	14.7
Reinforced concrete....cu. yds.	2,276	260	260	11.4	11.4
First-class masonry coping....cu. yds.	31	3.8	3.8	12.3	12.3
Wash wall....cu. yds.	75,310	9,505	9,505	12.6	12.6
First-class stone paving....sq. yds.	14	0	0	0	0
Second-class stone paving....sq. yds.	10,120	4,327	4,327	42.8	42.8
Third-class stone paving....sq. yds.	1,614	18	18	1.1	1.1
Cobblestone paving....sq. yds.	510	66	66	12.9	12.9
Second-class riprap....cu. yds.	400	0	0	0	0
Third-class riprap....cu. yds.	250	0	0	0	0
Fourth-class riprap....cu. yds.	9,540	0	0	0	0
Cast iron culvert pipe and specials....lbs.	1,208,200	700,142	728,742	57.9	60.3
Structural steel....lbs.	2,464,480	379,660	379,660	15.4	15.4
Metal reinforcement....lbs.	381,000	29,800	29,800	7.8	7.8
Iron castings, plain....lbs.	16,500	0	0	0	0
Expanded metal....lbs.	5,700	0	0	0	0
Portland cement sidewalk....sq. ft.	5,850	0	0	0	0
Relaying flag sidewalks....sq. yds.	45	0	0	0	0
Wooden pavement, 2½ in. thick....sq. yds.	1,760	267	267	15.2	15.2
Wooden pavement, 3½ in. thick....sq. yds.	2,012	409	409	20.3	20.3
Wooden block pavement....sq. yds.	500	0	0	0	0
Wooden fence....lin. ft.	9,880	0	0	0	0
Wrought iron pipe railing....lin. ft.	872	159	159	18.2	18.2
Lattice railing....lin. ft.	1,600	385	385	24.1	24.1
Repointing old masonry....lin. ft.	16,000	0	0	0	0
Drilling bolt holes in old masonry....lin. ft.	100	0	0	0	0
Resetting pipe railing....lin. ft.	230	0	0	0	0
Sluice-gates, 36 in. x 36 in....No.	3	3	3	100	100
Sluice-gates, 24 in. x 24 in....No.	4	0	0	0	0
Sluice-gates, 24 in. diam....No.	1	0	0	0	0
Sluice-gates, 42 in. diam....No.	3	0	0	0	0
Metal in guard-gates....lbs.	465,000	0	0	0	0
Machinery for lift bridge....lbs.	52,000	0	0	0	0
Electrical equipment....No.	1	0	0	0	0
Operators' cabin....No.	1	0	0	0	0
Pump....No.	1	0	0	0	0
Tar felt waterproofing....sq. ft.	275,250	0	0	0	0
Removing old bridge superstructure...lump sum	$2,500	0	0	0	0
Maintaining navigation....lump sum	$12,000	$2,280	$2,280	19	19
Maintaining highway traffic....lump sum	$8,000	$2,820	$3,320	35.25	41.5
Gross estimate....	$2,045,826 90	$576,708 07	$591,226 70	28.19	28.90

"Contract No. 38.

"This contract provided for the construction of the superstructure, substructure and approaches for a highway bridge at Wappings, 2.5 miles west of Fairport.

"As noted in the last annual report, this contract was completed in August, 1909. The contractors were Henry Tosh and Sons, of Port Byron, N. Y., the contract price being $16,869.90 and the final estimate, including alteration No. 1, was $16,286.67.

"This bridge has been in service over two years and with the exception of the flooring, has developed no evidences of wear up to the present time. This is especially true of the concrete approach slabs, that have caused trouble elsewhere under similar conditions.

"Contract No. 41.

"This contract provided for building embankments at Irondequoit creek crossing. Length of contract, about 0.8 mile. Butler Brothers Construction Company, of New York city, were the contractors. L. G. Fisher, Assistant Engineer, was in charge of this contract until its completion.

"This contract, which in some ways was unique, as described in the last report, was completed in March, 1911, when an alteration eliminating the clay lining on the south side of the west embankment was made. All other work was completed in November, 1910. The final estimate was $241,644.

"Following is a table showing the amounts and percentages of work done during the year, the actual quantities in the final estimate and the percentages the final quantities bore to the preliminary estimate quantities:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done—final estimate.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$250	$112 50	$250	45	100
Grubbing.....cu. yds.	†40,000	*23,391	42,342	6.5	105.9
Excavation.....cu. yds.	1,035,700	12,346	867,278	1.2	83.7
Forming embankment.....cu. yds.	834,700	29,792	847,096	3.6	101.5
Second-class concrete.....cu. yds.	320	0	203.9	0	63.7
Fourth-class riprap.....cu. yds.	320	6.3	6.3	2	2
Expanded metal.....sq. ft.	1,800	0.3	1,589	0.17	88.3
Maintaining highway traffic.....lump sum	$1,000	$200	$1,000	20	100
Wooden fence.....lin. ft.	1,240	1,223	1,223	98.6	98.6
Lining.....cu. yds.	490	540	540	110.2	110.2
Gross estimate.....	$274,917 50	$7,933 50	$241,644	2.9	87.9
Extra work order dated August 4, 1909.....	$102 60		$97 47		Finished

* 20,794 cubic yards of increase due to reclassification of material from excavation to grubbing.
† Increased from 19,000 to 40,000 by resolution of Canal Board dated October 25, 1910.



BARGE CANAL, CONTRACT NO. 63.

View a little west of the break in the canal bank near Bushnell's Basin, showing plank used on tow-path bank.

" Contract No. 23.

" This contract provides for the construction of a land line from King's Bend to the Genesee river, a distance of 5.63 miles. H. R. Wickham, Assistant Engineer, has been in charge.

" Contract No. 23 was let to Millard and Lupton Co., of Philadelphia, Pa., August 18, 1909.

" Considerable progress was made on this contract during the past year. Two to three 70-ton steam-shovels have continued excavating the prism through the 'divide,' sending the material by seven and eight 12-yard car trains, two miles easterly to the prism embankment. These embankments, extending for about two miles along each side of the prism, have been built to the full height and width in places and are about 65 per cent completed, while a considerable part is already backed with upwards of 30 feet width of spoil.

" At the easterly end of the contract, one to two steam-shovels have continued working at the prism excavation between locks Nos. 32 and 33, besides excavating a large part of the site for lock No. 33. The material for the most part has been placed in the high embankment west of lock No. 33.

" On account of the early and severe winter all work other than concreting was discontinued from about the middle of November to the first of April, and the placing of concrete was discontinued during January and February.

" During the year the two large Allen creek culverts under South avenue and under the canal prism have been completed, as have also three drainage ditch culverts. The concrete masonry for lock No. 32, with its upper guide wall and spillway, has been completed; also the by-pass culvert under Kingsley road. At lock No. 33 the concrete floor and bottom of both side walls and breast wall have been placed, while the upper spillway and power house are nearly completed. The abutments for Kingsley road, South avenue and East Henrietta road bridges have also been completed.

" Up to April 1, 1911, the gravel used in second-class concrete was the Palmyra gravel, boated in on the canal during the previous navigation period, but inability to obtain it in sufficient amounts

and the uncertainty connected with obtaining it early in the season led the contractors to seek another supply. The gravel now used is from a pit about twelve miles from the west end of the contract, near Wadsworth, N. Y., reached by the Lehigh Valley railroad and brought to the site of lock No. 33 without rehandling. The concrete plant is very extensive — that at lock No. 32 consisting of a cableway with a 1,200-foot span and one fixed tower, at the base of which is the concrete mixer, consisting of a 1-yard Koehring mixer mounted between gravel bins and 2-yard Steubner bottom dump buckets. The other tower of cableway is mounted on trucks and can be moved so that any part of the lock and its approach walls can be reached by a bucket attached to the cable.

"At lock No. 33 the concrete plant consists of two 1-yard Koehring mixers mounted between gravel bins, 1-yard Steubner bottom dump buckets, 18-ton locomotives and flat cars for conveying buckets to lock site, where stiff-leg, guyed and traveling derricks transfer the buckets to the concrete forms. For isolated structures the mixer has been mounted on a frame on trucks, with a supply track immediately back of it, while the concrete is either dumped directly into the forms or into buckets, which in turn are handled by guyed derrick. A very small amount of wheelbarrow work has been used and scarcely any hand-mixing.

"The following table shows the amounts and percentages of work done during the year and the total to end of fiscal year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dams, pumping, etc.....lump sum	$9,000	$2,610	$2,700	29	30
Clearing.....lump sum	$600	$72	$492	12	82
Grubbing.....cu. yds.	†45,200	6,556	41,350	14.5	91.5
Excavation.....cu. yds.	2,929,970	699,466	1,326,616	23.9	45.3
Round timber bracing.....lin. ft.	3,000	0	0	0	0
Sheeting and bracing.....ft. B. M.	300,000	2,612	2,612	0.9	0.9
Forming embankment.....cu. yds.	1,095,050	326,402	638,353	29.8	58.3
Lining.....cu. yds.	4,560	660	660	14.5	14.5
Sawed lumber, yellow pine or Douglas fir.ft. B. M.	33,000	0	0	0	0
White oak lumber.....ft. B. M.	16,000	1,188	1,188	7.4	7.4
Sawed lumber in needles.....ft. B. M.	13,000	0	0	0	0
Foundation piles.....lin. ft.	68,145	0	1,313	1.9	1.9
Wooden sheet-piling.....ft. B. M.	792,000	0	0	0	0
Steel sheet-piling.....sq. ft.	4,500	0	0	0	0



Section of channel in embankment.



Section of channel in deep cutting.

Contract No. 23 passes through a hill that requires a cut of 63 feet at the greatest depth. When it traverses low ground, upon which must be an embankment, a maximum of 42 feet to top of side banks being necessary.

BARGE CANAL, CONTRACT NO. 23.

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Second-class concrete.....cu. yds.	79,100	34,118	35,965	43.1	45.4
Second-class reinforced concrete.....cu. yds.	770	192	192	24.9	24.9
First-class masonry coping.....cu. yds.	14	0	0	0	0
Dry retaining wall.....cu. yds.	39,400	0	0	0	0
Wash wall.....cu. yds.	38,200	0	0	0	0
Second-class stone paving.....sq. yds.	280	0	0	0	0
Third-class stone paving.....sq. yds.	3,380	0	0	0	0
First-class riprap.....cu. yds.	200	0	0	0	0
Second-class riprap.....cu. yds.	860	0	0	0	0
Third-class riprap.....cu. yds.	770	0	0	0	0
Fourth-class riprap.....cu. yds.	5,270	53	53	1	1
Grouted riprap.....cu. yds.	1,100	0	0	0	0
Cast iron pipe and specials.....lbs.	43,600	0	0	0	0
Structural steel.....lbs.	920,000	12,664	12,742	1.38	1.39
Metal reinforcement.....lbs.	308,400	145,145	204,630	47.1	66.4
Iron castings, plain.....lbs.	97,800	7,466	7,466	7.6	7.6
Iron castings, machined.....lbs.	39,880	14,595	14,595	36.6	36.6
Metal in guard-lock gates.....lbs.	425,000	0	0	0	0
Metal in buffer-beams.....lbs.	170,000	694	694	0.4	0.4
Metal in lock-gates.....lbs.	525,600	13,277	13,277	2.5	2.5
Metal in lock-valves.....lbs.	140,000	434	434	0.3	0.3
Brick lining.....cu. ft.	17,400	2,889	2,889	16.6	16.6
Wood pavement, 2¾ inches thick.....sq. yds.	2,300	0	0	0	0
Wooden fence.....lin. ft.	12,800	0	0	0	0
Wrought iron pipe railing.....lin. ft.	230	0	0	0	0
Lattice railing.....lin. ft.	1,100	0	0	0	0
Storehouses.....No.	3	0	0	0	0
Office buildings.....No.	3	0	3	0	100
Gate hoists, light.....No.	2	0	0	0	0
Gate hoists, heavy.....No.	2	0	0	0	0
Maintaining highway traffic.....lump sum	$2,000	$860	$1,060	43	53
Gross estimate.....	$1,812,297	$444,637 66	$660,382 92	24.54	36.44

† Increased from 35,200 to 45,200 cubic yards by resolution of Canal Board, dated June 28, 1911.

"*Contract No.* 21.

"This contract provides for excavating the canal prism and constructing guard-lock, highway bridge abutments and all appertaining work between the Genesee river and the east end of contract No. 6, a distance of 2.43 miles. H. J. Hemstreet, Assistant Engineer, has been in charge.

"Contract No. 21 was let to Lane Brothers Company, of Altavista, Va., April 7, 1910.

"The work of excavating the prism section has continued with the same plant as shown in the last annual report. Shovel No. 4 worked the entire year, while No. 1 worked less than four months and has been shipped away. Nos. 2 and 3 worked about five and nine months, respectively. The excavated material was disposed

of in adjacent spoil banks. The train outfit consists of 16-yard, K. and J., air-dump cars hauled by 40-ton locomotives for two shovels, and 6-yard cars hauled by 18-ton locomotives for the other shovels, all being of standard gage.

"In October, 1910, two steam drills commenced drilling the rock in the prism cut and continued throughout the year, more machines being added from time to time until a total of 14 drills are now being used.

"In March, 1911, two channeling machines were placed in operation, cutting the prism sides to the proper lines. Four more machines were added at various times and channeling continued as circumstances permitted.

"The shovel cuts have been drained by a 10-in. centrifugal pump operated intermittently by electric power. The abutments for Brooks avenue bridge have been completed and those for Scottsville road bridge about 50 per cent completed.

"The following table shows the amounts and percentages of work done during the year and the total to end of fiscal year:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$250	0	$100	0	40
Excavation.....cu. yds.	2,350,000	665,614	956,362	28.3	40.7
Sheeting and bracing.....ft. B. M.	16,000	0	0	0	0
Channeling.....sq. ft.	390,000	15,682	15,682	4	4
Forming embankment.....cu. yds.	100	0	0	0	0
Lining.....cu. yds.	560	0	0	0	0
Sawed lumber.....ft. B. M.	3,000	0	0	0	0
Second-class concrete.....cu. yds.	6,400	697	697	10.9	10.9
Dry retaining wall.....cu. yds.	2,200	0	0	0	0
Rock spoil protection.....cu. yds.	8,000	0	0	0	0
Wash wall.....cu. yds.	8,000	0	0	0	0
Cobblestone paving.....sq. yds.	400	0	0	0	0
Third-class riprap.....cu. yds.	100	0	0	0	0
Fourth-class riprap.....cu. yds.	100	0	0	0	0
12-inch vitrified pipe, laid.....lin. ft.	27	0	0	0	0
Structural steel.....lbs.	2,400	0	0	0	0
Metal reinforcement.....lbs.	9,000	3,947	3,947	43.9	43.9
Iron castings, plain.....lbs.	12,600	0	0	0	0
Wooden fence.....lin. ft.	310	0	0	0	0
Metal in guard-gates.....lbs.	448,000	0	0	0	0
Drilling bolt holes in rock.....lin. ft.	1,000	0	0	0	0
Maintaining traffic.....lump sum	$2,000	$880	$1,100	44	55
Coffer-dam, pumping, etc.....lump sum	$4,000	$1,000	$1,400	25	35
Gross estimate.....	$1,323,150	$332,856 34	$474,589 12	25.2	35.9



BARGE CANAL, CONTRACT No. 23.

View of the spillway at the upper end of lock No. 32. Just beyond the spillway is seen the movable tower of the cableway used for conveying concrete in building the lock.

... consists of 16-yard ...
... locomotives for two ...
... locomotives for the other ...



BARGE CANAL, CONTRACT NO. 23.

View of the spillway at the upper end of lock No. 32. Just beyond the spillway is seen the movable tower of the cableway used for conveying concrete in building the lock.

about a foot above grade. This was completed in August, 1911. Steam drills completed drilling rock on August 15, while the six channeling machines completed their work in May.

" Some cleaning up in the bottom of the prism was done by hand and also the reshaping of bridge approaches. Considerable guard rail was also built on bridge approaches and wash wall completed.

" Actual construction work on this contract was completed in September, 1911, and the final estimate is now being made.

" The following table shows the amounts and percentages of work done during the year and the total to complete the contract, the latter figures, however, not being the final estimate figures:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$700	0	$700	0	100
Grubbing.....cu. yds.	4,500	0	3,711	0	82.5
Excavation.....cu. yds.	2,095,460	83,385	2,082,340	4	99.4
Channeling.....sq. ft.	228,840	33,106	211,840	14.5	92.6
Forming embankment.....cu. yds.	38,000	749	35,584	2	93.6
Puddle.....cu. yds.	1,700	0	0	0	0
White oak timber and plank....ft. B. M.	500	0	0	0	0
Hemlock timber and plank.....ft. B. M.	500	0	0	0	0
Second-class concrete.....cu. yds.	*3,407	0	3,847	0	112.9
Third-class concrete.....cu. yds.	300	0	264.6	0	88.2
First-class masonry coping.....cu. yds.	15	0	11.75	0	78.3
Wash wall.....cu. yds.	9,990	594	10,292	6	103
Stone paving.....sq. yds.	60	0	0	0	0
Fencing.....lin. ft.	1,400	1,607	1,607	114.8	114.8
Macadam pavement.....sq. ft.	500	0	0	0	0
Gross estimate.....	$1,035,228 05	$43,366 88	$1,025,718 34	4.19	99.08
Extra work order, dated Dec. 22, 1908...	$22 54		$22 54		Finished.
Extra work order, dated Sept. 20, 1910...	$1,016 25		$743 94		Finished.

* Increased from 1,757 to 3,407 cubic yards, by resolution of Canal Board, dated December 23, 1909.

" *Contract No.* 60.

" This contract provides for the construction of the canal from the west end of contract No. 6 to about one-half mile west of Adams Basin bridge, a distance of 8.53 miles. C. L. Baldwin, Assistant Engineer, has been in charge.

" Contract No. 60 was let to the Empire Engineering Corporation, September 22, 1908.

" The structures on this contract are practically completed, but a small amount of paving and finishing of bridge approaches re-



BARGE CANAL, CONTRACT No. 21.
View showing Brooks avenue bridge and excavation operations near by.

mains to be done. Prism excavation, however, is not yet completed. The ladder dredge *Mohawk* continued excavation in the prism, disposing of its material in adjacent embankment. This machine worked from Sta. 3171 to Sta. 3038, the eastern limit of old canal enlargement; in the middle of August, 1911, it moved back to clean up high places in the bottom of the prism.

"A crane scow equipped with an orange-peel bucket worked easterly from Sta. 3415 to Sta. 3120, cleaning up after the ladder dredge. During the closed season of navigation prism excavation was carried on by a steam-shovel outfit, a derrick excavator and with teams and scrapers. The derrick excavator was later mounted on a scow and used during the summer of 1911 in conjunction with the dredge and crane scow. Practically all excavated material has been placed in prism embankment.

"The work of building wash wall and lining tow-path has been continued. The substructure for guard-gate was completed early in the spring of 1911.

"During the past winter old culverts 44 and 45 were taken out and new cast iron pipe culverts built.

"A considerable amount of wooden sheet-piling has been driven along both banks at various places to protect them against seepage. Puddle has also been used in several places to advantage.

"About 14,000 cu. yds. of material have been excavated at the site for the turning basin west of bridge No. 95.

"The following table shows the amounts and percentages of work done during the year and the total done to end of fiscal year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dam, pumping, etc.....miles	8.5	0.75	7.25	8.8	85.3
Clearing.....lump sum	$2,600	$130	$2,600	5	100
Grubbing.....cu. yds.	47,644	3,877	37,162	8.1	78
Excavation.....cu. yds.	1,249,230	212,492	1,057,106	17	84.6
Sheeting and bracing.....ft. B. M.	135,000	0	77,774	0	57.6
Channeling.....sq. ft.	26,000	0	15,312	0	58.9
First-class embankment.....cu. yds.	749,040	153,660	557,550	20.5	74.4
Second-class embankment.....cu. yds.	191,800	28,165	149,651	14.7	78
Lining.....cu. yds.	26,710	6,789	15,960	25.4	59.8
Puddle.....cu. yds.	63,747	9,505	19,117	14.9	30
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	41,000	0	22,393	0	54.6
Foundation piles.....lin. ft.	19,050	0	5,176	0	27.2

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Wooden sheet-piling.....ft. B. M.	42,000	1,296	9,372	3.1	22.3
Second-class concrete.....cu. yds.	13,319	1,082	13,532	8.1	101.6
Third-class concrete.....cu. yds.	3,049	210	2,143	6.9	70.3
Reinforced concrete.....cu. yds.	1,580	0	1,526	0	96.6
First-class masonry coping.....cu. yds.	15	10.3	12	68.7	80
Wash wall.....cu. yds.	66,721	17,074	56,054	25.6	84
Second-class stone paving.....sq. yds.	6,755	2,012	3,469	29.8	51.4
Third-class stone paving.....sq. yds.	1,860	352	1,787	18.9	96.1
Third-class riprap.....cu. yds.	5,594	7	143	1.2	25.6
Fourth-class riprap.....cu. yds.	100	0	57	0	57
Cast iron culvert pipe and specials.....lbs.	676,250	160,261	650,661	23.7	96.2
12-inch vitrified pipe, laid.....lin. ft.	*760	242	262	31.8	34.5
Trench and backfilling 12-in. pipe..lin. ft.	20	0	20	0	100
Structural steel.....lbs.	817,360	2,166	807,066	0.26	98.7
Metal reinforcement.....lbs.	101,840	733	90,930	0.72	89.3
Wooden pavement, 3 inches thick.sq. yds.	1,330	0	1,304	0	98.1
Wooden pavement, 4 inches thick.sq. yds.	650	0	622		95.7
Wooden fence.....lin. ft.	16,591	2,656	13,247	16	79.8
Wrought iron pipe railing.....lin. ft.	205	0	138	0	67.3
Lattice railing.....lin. ft.	410	3	401	0.73	97.8
Sluice-gates, 36 x 40 inches.....No.	7	0	7	0	100
Sluice-gates, 33 x 33 inches.....No.	2	0	2	0	100
Repointing old masonry.....lin. ft.	1,000	0	1,150	0	111.5
Maintaining navigation.....lump sum	$11,000	$3,091	$10,219	28.1	92.9
Maintaining highway traffic....lump sum	$3,500	$126	$3,377 50	3.6	96.5
36-inch vitrified pipe, laid.....lin. ft.	244	0	239	0	98
Additional bailing and draining.lump sum	$1,500	$495	$1,500	33	100
Gross estimate.....	$1,490,552 83	$244,304 42	$1,184,163 13	16.39	79.44
Extra work order, dated Feb. 2, 1909....	$5,180	Finished.	$4,957 87		95.7
Extra work order, dated April 26, 1909...	1,650	Finished.	1,498		90.8
Extra work order, dated Aug. 19, 1909...	4,371	Finished.	2,946 47		67.4
Extra work order, dated Oct. 4, 1909.....	578 58	Finished.	634 51		109.6
Extra work order, dated Jan. 3, 1910.....	1,525	Finished.	1,510 76		99.1
Extra work order, dated Dec. 15, 1910...	11,150 40	Finished.	11,150 40		100
Extra work order, dated March 3, 1911...	3,200	Finished.	3,113 09		97.3
Extra work order, dated April 18, 1911...	250	Finished.	246 79		98.7

*12-inch vitrified pipe laid, increased from 20 to 760 lin. ft. by resolution of Canal Board, dated J.[illegible] 26, 1912.

"*Contract No.* 61.

"This contract provides for the improvement of the canal from the west end of contract No. 60 to the west line of Monroe county, a distance of 7.39 miles. A. S. Milinowski, Assistant Engineer, is in charge.

"Contract No. 61 was let to Cleveland & Sons Company, of Brockport, N. Y., October 13, 1908.

"During the past fiscal year the following structures were completed: Bridges Nos. 104 and 106; abutments for bridges Nos. 109 and 110 and superstructure at Brockport waste-weir; culverts Nos. 56, 57, 60, 61 and several small road culverts; also the masonry for guard-gate; wing wall of Brockport waste-weir. The retaining wall at Brockport has been nearly completed.



BARGE CANAL, CONTRACT NO. 61.
View showing progress in constructing culvert No. 61.



BARGE CANAL, CONTRACT NO. 61.
View of the Brockport waste-weir during construction.

"Prism excavation was continued with three Lidgerwood excavators, together with scows for transporting the material, clamshell derrick for unloading scows and regular locomotives and dump cars. Most of the excavated material has been placed in prism embankments and bridge approaches or used for backfilling around structures.

"Considerable excavation has also been done with teams and scrapers when circumstances permitted. Where rock occurred above grade it was removed in the dry, during the closed period, with derrick and dump cars.

"Grubbing has been done wherever conditions required it. Considerable quantities of wash wall have been built and coping stones placed in position. Stone paving has been placed at ends of culverts and at bridge approaches, while considerable lining has been placed on approaches and on tow-path.

"The following table shows the amounts and percentages of work done during the year and the total done to end of fiscal year:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dam, pumping, etc.....miles	7.4	3	4	40.5	54.1
Clearing.....lump sum	$?,400	$240	$2,400	10	100
Grubbing.....cu. yds.	48,644	13,805	32,473	28.4	66.8
Excavation.....cu. yds.	969,313	307,973	575,519	31.8	59.4
Sheeting and bracing.....ft. B. M.	*32,000	14,476	24,903	45.2	77.8
First-class embankment.....cu. yds.	566,220	199,407	313,126	35.2	55.3
Second-class embankment.....cu. yds.	96,063	20,391	66,705	21.2	69.4
Lining.....cu. yds.	18,875	2,862	2,877	15.17	15.24
Puddle.....cu. yds.	14,584	1,118	1,410	7.7	9.7
Sawed lumber, yellow pine or Douglas fir, ft. B. M.	29,000	5,732	6,202	19.8	21.4
Foundation piles.....lin. ft.	3,400	469	1,606	13.8	47.2
Wooden sheet-piling.....ft. B. M.	5,000	0	3,586	0	71.7
First-class concrete.....cu. yds.	65,000	0	0	0	0
Second-class concrete.....cu. yds.	10,850	4,347	8,944	40.1	82.4
Third-class concrete.....cu. yds.	1,495	196	818	13.1	54.7
Reinforced concrete.....cu. yds.	348	93	249	26.7	71.6
First-class masonry coping.....cu. yds.	8	0	0	0	0
Dry retaining wall.....cu. yds.	1,500	0	0	0	0
Wash wall.....cu. yds.	63,809	8,446	19,617	13.2	30.7
Second-class stone paving.....sq. yds.	498	163	186	32.7	37.4
Third-class stone paving.....sq. yds.	1,196	114	114	9.5	9.5
Cobblestone paving.....sq. yds.	275	0	0	0	0
Third-class riprap.....cu. yds.	280	0	0	0	0
Cast iron pipe and specials.....lbs.	300,100	0	42,260	0	14.1
12-in. vitrified pipe, laid.....lin. ft.	338	10	134	3	39.6
24-in. vitrified pipe, laid.....lin. ft.	110	0	94	0	85.5
Structural steel.....lbs.	444,675	210,909	214,654	47.4	4.83
Metal reinforcement.....lbs.	44,568	11,747	31,066	26.4	69.7
Wooden pavement, 2½ in. thick...sq. yds.	820	528	528	64.4	64.4
Wooden pavement, 3½ in. thick...sq. yds.	220	0	0	0	0
Wooden fence.....lin. ft.	8,500	3,133	3,133	36.9	36.9

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Wrought iron pipe railing.....lin. ft.	660	0	0	0	0
Lattice railing.....lin. ft.	330	0	0	0	0
Sluice gates and hoists.....No.	3	0	3	0	100
Relaying board walks.....sq. ft.	900	0	0	0	0
Repointing old masonry.....lin. ft.	1,000	0	0	0	0
Drilling bolt holes in masonry.....lin. ft.	1,400	59	544	4.2	38.9
Maintaining navigation.....lump sum	$10,000	$3,000	$5,500	30	55
Maintaining highway traffic....lump sum	$2,000	$500	$1,100	25	55
Additional bailing and draining.lump sum	$4,000	0	0	0	0
	$1,089,490 03	$308,010 66	$577,245 83	28.27	52.98
Extra work order, dated Nov. 24, 1909...	$300 00		$101 70		Finished.

*Sheeting and bracing increased from 20,000 to 32,000 ft. B. M. by resolution of Canal Board, dated April 6, 1911.

ERIE CANAL, RESIDENCY NO. 10–A.

Resident Engineer J. V. Hogan reports as follows:

"Residency No. 10-A extends from the easterly line of Orleans county to 100 feet east of Main street bridge in Gasport, a distance of 31.69 miles, and includes contracts Nos. 62, 9, 65, 64 and 75.

"*Contract No.* 62.

"This contract provides for the construction of the Barge canal from the easterly line of Orleans county to 0.164 mile east of Eagle Harbor bridge, a distance of 14.15 miles. Owing to the length of the contract, it was deemed necessary to establish two contract offices, as difficulty was encountered in covering the ground with one engineering organization. An office was established at Holley, J. S. Summers, Assistant Engineer, in charge, and another established at Albion, with George D. Kellogg, Assistant Engineer, in charge.

"Contract No. 62 was let to I. M. Ludington's Sons, Inc., on August 11, 1910, and work started October 26, 1910.

"Appropriation surveys for the entire contract were completed and maps made covering about 95 per cent of the right of way. Cross-sections, base line and work of this nature are completed.

"The work consists entirely of enlarging the present Erie canal, together with necessary bridges, culverts and waste-weirs. The



BARGE CANAL, CONTRACT NO. 62.

View showing the construction of a side wall of the concrete trough near Holley.

plant for this contract has been well selected and work started in a systematic and thorough manner, while large quantities of machinery, tools, supplies, etc., are on hand and contractors have given every indication of a desire to carry on the work vigorously.

"The following is a table showing the percentage of work done during the year and to date:

ITEMS OF WORK.	Preliminary estimate.	Total work done during year and to date.	Per cent of work done during year and to date.
Coffer-dams, pumping, bailing and draining miles	14.15	3.66	25.8
Clearing lump sum	$7,200	$4,413 60	61.3
Excavation cu. yds.	1,625,600	574,348	35.3
Sheeting and bracing ft. B. M.	160,000	31,374	19.6
Round timber bracing lin. ft.	2,000	438	21.9
Channeling sq. ft.	11,960	589	4.8
Forming embankment cu. yds.	718,200	216,028	30.1
Puddle cu. yds.	30,000	122	0.4
Sawed lumber, yellow pine or Douglas fir ft. B. M.	64,000	2,314	3.6
Foundation piles lin. ft.	8,000	620	7.8
Second-class concrete cu. yds.	45,120	9,037	20.0
Third-class concrete cu. yds.	4,444	1,757	39.6
Reinforced concrete cu. yds.	4,160	1,035	24.9
First-class masonry coping cu. yds.	29	2	6.9
Rubble masonry cu. yds.	5,125	784	15.3
Wash wall cu. yds.	101,100	4,594	4.5
Cast iron culvert pipe and specials lbs.	1,704,000	731,008	42.9
Trenching and backfilling lin. ft.	450	200	44.5
Structural steel lbs.	2,403,300	273,575	11.4
Metal reinforcement lbs.	443,000	88,845	20.0
Expanded metal lbs.	270	240	89.0
Wooden pavement, 2½ in. thick sq. yds.	3,224	326	10.1
Metal in guard-gates lbs.	465,000	131,000	28.2
Maintaining navigation lump sum	$16,800	$6,300	37.5
Maintaining highway traffic lump sum	$8,400	$1,980 72	23.6
Buildings to be removed No.	68	26	38.3
Deduct for bridge superstructures in place lump sum	$600	$100	16.7

Total of all work done during year = 25 per cent of contract price.
Total of all work done to date = 25 per cent of contract price.

"*Contract No.* 9.

"This contract extends from 0.164 mile east of Eagle Harbor bridge to 0.09 mile west of Beal's bridge, a distance of 5.68 miles. Arthur S. Whitlock, Assistant Engineer, is in charge.

"This contract was let to the Thomas Crimmins Contracting Company, March 18, 1908, and was completed during this year, the last monthly estimate being dated May 1, 1911. The final estimate is completed and the contract has been accepted. An offset center line has been monumented with concrete monuments every 500 feet on tangents and at the P. C. and P. T. of curves.

"Contract No. 9 consisted entirely of widening the existing Erie canal and included bridges, culverts, etc. The original contract has been changed by alterations Nos. 2, 3, 5, 6, 7, 8, 9 and 10.

"The total amount of contract No. 9, figured on the basis of quantities shown in the preliminary estimate, including alterations, and with the contractors' prices, shows a total of $803,297, while the final estimate, computed on a basis of actual work done, shows a total of $655,461.

"It will be seen by reference to the table that the principal differences between quantities of preliminary estimate, monthly estimate and final estimate occur in items of grubbing, excavation and forming embankment, and while these individual items vary as much as 43 per cent of the final estimate quantities, this variation seems to extend generally throughout the quantities for different sections and different structures on the contract. A reference to the preliminary estimate shows that excavation quantities were rounded to such an extent that there was an increase of 70,000 cubic yards and an increase in embankment of 43,000 cubic yards and in grubbing of 4,000 cubic yards.

"At the various structures such as culverts, bridges, dock walls, etc., excavation and embankment in the preliminary estimate were computed on the basis of 1 on 1 slopes for structure excavations, while in most cases the actual excavation had nearly vertical slopes. This caused a difference of 4,000 yards in some cases.

"The following table shows the status of this contract to date:

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.†	Total work done to date (final estimate).	Per cent of work done during year.	Per cent of work done to date.
Clearing.....lump sum	$1,800	$180	$1,800	10	100
Grubbing.....cu. yds.	40,145	1,409	27,903	3.5	69.5
Excavation.....cu. yds.	749,935	*4,340.	524,467	*0.6	70
Sheeting and bracing.....ft. B. M.	70,000	258	20,172	0.4	28.8
Forming embankment.....cu. yds.	428,704	45,975	361,725	10.7	84.3
Lining.....cu. yds.	14,504	5,666	12,889	39.1	88.8
Puddle.....cu. yds.	4,000	393	3,593	9.8	89.8
Sawed lumber, yellow pine or Douglas fir.ft. B. M.	95,000	13,824	86,588	14.6	91.1
Foundation piles.....lin. ft.	30,770	0	2,434	0	7.9
Second-class concrete.....cu. yds.	5,905	*59.5	5,132.5	*1	86.8
Third-class concrete.....cu. yds.	4,436	9.1	3,421.1	0.2	77.1
Reinforced concrete.....cu. yds.	1,390	73.8	1,327.8	5.3	95.5
First-class masonry.....cu. yds.	190	9	144.8	4.7	76.2
First-class masonry backing.....cu. yds.	110	15	106.8	13.6	97.1
First-class masonry coping.....cu. yds.	24	*0.65	18.35	*2.7	76.5
First-class masonry ringstones.....cu. yds.	8	0	5.6	0	70



BARGE CANAL, CONTRACT NO. 64.

View at Middleport, showing existing vertical wall faced and topped with concrete. Considerable of the wall built during the 9-foot enlargement has been thus utilized.

Withdrawn

ITEMS OF WORK.	Preliminary estimate as affected by alterations.	Work done during year.†	Total work done to date (final estimate).	Per cent of work done during year.	Per cent of work done to date.
First-class masonry sheeting....cu. yds.	70	*0.1	45.5	*0.1	65
Brick masonry....cu. yds.	17	0.2	6.2	1.2	36.5
Wash wall....cu. yds.	41,041	3,022	45,174	7.4	110.1
Second-class stone paving....sq. yds.	440	128	229	29.1	52
Third-class stone paving....sq. yds.	1,350	13	975	1.0	72.2
Third-class riprap....cu. yds.	5,187	5,263	5,541	101.5	106.8
Cast iron culvert pipe and specials....lbs.	939,400	*165	871,158	*0	92.7
8-in. vitrified pipe, laid....lin. ft.	60	0	45	0	75
15-in. vitrified pipe, laid....lin. ft.	220	150	195	68.2	88.7
Trenching and backfilling for 8-in. vitrified pipe lin. ft.	60	0	45	0	75
Trenching and backfilling for 15-in. vitrified pipe lin. ft.	60	0	45	0	75
Structural steel....lbs.	315,065	210	311,598	0.1	98.9
Metal reinforcement....lbs.	83,080	621	74,094	0.7	89.2
Flagstone walks....sq. yds.	20	0	0	0	0
Wooden fence....lin. ft.	5,080	2,056	4,768	40.5	93.9
Wrought iron pipe railing....lin. ft.	30	0	18	0	60
Lattice railing....lin. ft.	850	854	854	100.5	100.5
Taking up and resetting catch basin covers....No.	2	0	2	0	100
Maintaining navigation....lump sum	$8,000	$2,000	$8,000	25	100
Maintaining highway traffic....lump sum	$2,500	$425	$2,500	17	100
Drilling holes in old masonry....lin. ft.	29	0	28	0	96.5
Additional clearing....lump sum	$36	$36	$36	100	100
Lift-bridge, steel....lbs.	440,000	50,014	437,624	11.4	99.5
Machinery....lbs.	50,000	50,670	50,670	101.3	101.3
Electrical equipment....No.	2	2	2	100	100
Electrical pumps....No.	2	2	2	100	100
Operator's cabins....No.	2	0.8	2	40	100
Brick pavement....sq. yds.	84	70.6	70.6	84	84
Additional maintaining highway traffic...lump sum	$500	$500	$500	100	100
Deduct for buildings....lump sum	$1,000	$1,000	$1,000	100	100
Deduct for bridge superstructures....lump sum	$200	$200	$200	100	100
Gross estimate....	$803,297	$55,399 88	$655,461 19	6.9	

* A decrease, due to final estimate computations.
† These figures are the differences between the totals appearing in last year's report and the final estimate computations. They do not, therefore, in every instance represent the amount of work done during the year.

"*Contract No.* 64.

"This contract extends from 600 feet west of Prospect street bridge at Medina to 100 feet east of Gasport bridge, a distance of 9.91 miles. R. S. Merrill, Assistant Engineer, is in charge.

"This contract was let to the Empire Engineering Corporation, August 6, 1908, and has been under construction since that time.

"The following preliminary work was completed on this contract: Prism cross-sections were taken for about seven miles and appropriation surveys and maps have been brought up to date.

"Since the beginning of this contract changes have been made in the original plans embodied in alterations Nos. 2, 3, 5, 6, 7, 8, 9 and 10.

"The structures on this contract are entirely completed with the exception of a guard-gate at Gasport, recently added by alteration No. 10. The remaining work consists of excavation, embankment and wash wall.

"Work has progressed slowly during the past summer, but the contracting company has been reorganized and at the present time gives every assurance of pushing this work to its full capacity, so that it may be completed as soon as possible.

"The attached table shows the amount of work done during the past year and also the amount completed to date:

ITEMS OF WORK.	Preliminary estimate, as affected by alterations Nos. 2 to 10, inclusive.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dams, pumping, bailing and draining...miles	10	0	6	0	60
Clearing.....lump sum	$2,600	0	$2,210	0	85
Grubbing.....cu. yds.	54,982	12,892	28,794	23.6	52.5
Excavation.....cu. yds.	1,138,281	213,528	496,611	18.8	43.6
Forming embankment, first-class.....cu. yds.	413,731	96,647	218,634	23.4	52.8
Forming embankment, second-class.....cu. yds.	121,060	41,471	96,559	34.3	79.8
Lining.....cu. yds.	26,034	1,210	1,771	4.6	6.8
Puddle.....cu. yds.	4,517	325	746	7.2	16.5
Sawed lumber.....ft. B. M.	605,000	5,955	22,808	9.8	37.7
Foundation piles.....lin. ft.	3,500	0	2,300	0	65.8
Wooden sheet-piles.....ft. B. M.	134,000	13,000	36,456	9.7	27.2
Second-class concrete.....cu. yds.	17,231	3,963	14,605	23.1	84.8
Third-class concrete.....cu. yds.	3,201	379	2,702	11.2	84.4
Reinforced concrete.....cu. yds.	728	6	659	0.8	95.2
First-class masonry.....cu. yds.	64	0	48	0	75
First-class masonry bridge coping.....cu. yds.	50	1	9	0.2	18
Wash wall.....cu. yds.	69,702	11,635	19,064	16.7	27.4
Second-class stone paving.....sq. yds.	2,160	41	170	1.8	7.8
Third-class stone paving.....sq. yds.	2,800	225	495	8	17.7
Third-class riprap.....cu. yds.	420	12	12	2.8	28
Cast iron pipe and specials.....lbs.	1,109,805	249,861	1,112,831	22.5	Finished
Structural steel.....lbs.	957,360	118,654	943,138	12.4	98.5
Metal reinforcement.....lbs.	67,000	379	60,409	0.56	90.2
Wood pavement.....sq. yds.	2,600	789	2,311	30.4	88.9
Wooden fence.....lin. ft.	13,248	2,083	2,083	15.7	15.7
Sluice-gate valves.....No.	7	2	7	25.5	10
Relaying old masonry.....cu. yds.	180	0	17	0	9.4
Maintaining navigation.....lump sum	$13,000	$3,250	$11,050	25	85
Maintaining highway traffic.....lump sum	$4,500	$1,395	$3,375	31	75
Additional bailing and draining.....lump sum	$500	$300	$300	60	60
6-in. vitrified pipe, laid.....lin. ft.	270	260	260	96.3	96.3
Additional bailing and draining.....lump sum	$140	$140	$140	100	100

Percentage of work completed during year, 18.5,
Percentage of work completed to date, 52.1.

"Contract No. 75.

"This contract provides for the construction of guard-gate superstructures on the western division, one of which occurs 1.5 miles east of Middleport.



BARGE CANAL, CONTRACT NO. 67.
View of the outlet valves of the flume at the foot of the Lockport locks.

"No work has been done on this contract during the past year. The substructure for this guard-gate has been completed and is ready to receive the superstructure at any time.

"*Contract No.* 65.

"This contract extends from 0.09 mile west of Beal's bridge to 600 feet west of Prospect street bridge in Medina, a distance of approximately 1.95 miles.

"The plans have not been entirely prepared for this contract, which will consist principally of a cut-off from the loop of the old canal through Medina that will necessitate the crossing of Oak Orchard gorge. No work has been done in connection with the contract plans during the year in this office, with the exception of small investigations regarding topographical features, borings, etc."

ERIE CANAL, RESIDENCY NO. 10–B.

Resident Engineer C. J. McDonough reports as follows:

"Residency No. 10-B extends from a point about 100 feet east of Gasport bridge to the guard-lock at Pendleton, Niagara county, a distance of 11.7 miles, and embraces contracts Nos. 66, 67 and 40, now under way; also contracts not yet advertised for two lift bridges at Lockport and one at Gasport.

"*Contract No.* 66.

"This is the most westerly contract on the 'Sixty-Mile Level' and extends from a point 100 feet east of Gasport bridge to a point about 600 feet east of the Lockport locks, a distance of 6.35 miles. W. T. Huber, Assistant Engineer, is in charge.

"The contract was awarded to the Empire Engineering Corporation of New York city, September 22, 1908, and has been affected by five alterations, adding about $70,000 to the contract.

"The contract is typical of those on the 'Sixty-Mile Level,' being principally a cut and fill proposition. The general method of handling the work during the summer was to excavate by ladder dredge and cranes, depositing the material on the banks and level-

ing it off by teams and scrapers when it was sufficiently dried out. During the winter a steam-shovel and trains were used at Orangeport wide-water, and at other places cranes on the bank, with skips, handled material excavated by hand from the prism.

"Material which went into bridge approaches was handled principally by teams directly from prism to approach.

"From July to September, 1911, a drill-boat operated between Gasport and Orangeport, drilling rock, which will be removed during the winter.

"The ladder dredge left this contract on September 23, 1910, to work on contract No. 64, and returned on August 24, 1911, and up to September 30, excavated 18,305 cubic yards.

"During the year the following structures were built: Culverts 119, 121 and 125, Lockport waste-weir and 700 feet of vertical wall at Lockport. All the structures are now completed, except about 300 feet of concrete wall, principally facing near Angelus Mill, Lockport; new bottom in culvert No. 120; 300 feet of facing wall at Gasport and new retaining wall at Lake avenue bridge, provided in alteration No. 6.

"There remains about 90,000 cubic yards of prism excavation and about 25,000 cubic yards of embankment to complete the prism.

"The principal plant on the work is one ladder dredge and conveyor, one drill-boat, three cranes, one derrick-boat, two tugs, miscellaneous flat scows and supply boat.

"In view of the alterations, an extension of time has been requested.

"The following table shows the amount of work completed during the year and to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dams, pumping, bailing and draining, miles	6.35	1.85?	4.78	29.3	75.3
Clearing.....lump sum	$1,900	$855	$1,805	45	95
Grubbing.....cu. yds.	30,925	2,456	20,999	7.9	67.9
Excavation.....cu. yds.	661,532	190,833	498,892	28.9	75.4
Sheeting and bracing.....ft. B. M.	148,000	31,764	59,501	21.5	40.2
First-class embankment.....cu. yds.	287,472	78,903	166,421	27.5	57.9
Second-class embankment.....cu. yds.	61,600	12,957	58,115	21	94.3



BARGE CANAL, CONTRACT No. 67.

View showing progress in constructing the flight of two locks at Lockport. In the present canal there was a flight of five double locks. The new locks replace the south tier, the north tier caring for navigation during construction and to remain for the small boats of the future. At the upper end a portion of the new side wall is seen built against the north side walls of the old south tier of locks.



ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Lining.....cu. yds.	17,384	7,773	8,509	44.7	48.9
Puddle.....cu. yds.	8,374	4,635	5,965	55.3	71.2
Sawed lumber, yellow pine.....ft. B. M.	18,000	0	17,850	0	100
Foundation piles.....lin. ft.	3,830	0	3,522	0	100
Second-class concrete.....cu. yds.	14,283	2,949	12,893	20.7	90.3
Third-class concrete.....cu. yds.	2,058	816	1,814	39.7	88.1
Reinforced concrete.....cu. yds.	550	3	515		100
First-class masonry bridge coping.....cu. yds.	10	2.10	8.67	21	100
Wash wall.....cu. yds.	52,656	19,758	32,483	37.5	61.7
Second-class stone paving.....sq. yds.	685	93	578	13.6	84.4
Third-class stone paving.....sq. yds.	1,292	352	1,106	27.2	85.6
Third-class riprap.....cu. yds.	500	74	74	14.8	14.8
Cast iron culvert pipe and specials.....lbs.	449,310	285,585	410,877	63.6	100
Structural steel.....lbs.	683,300	1,607	659,848	0.2	96.6
Metal reinforcement.....lbs.	55,600	763	47,804	1.4	86
4-inch wood pavement.....sq. yds.	340	0	333	0	100
3-inch wood pavement.....sq. yds.	1,200	0	1,155	0	100
Wood fence.....lin. ft.	8,940	2,424	6,209	27.1	69.4
Wrought iron pipe railing.....lin. ft.	30	0	26	0	100
Lattice railing.....lin. ft.	640	0	632	0	100
Sluice-gate valves.....No.	3	3	3	100	100
Drilling bolt holes in masonry.....lin. ft.	650	155	355	23.9	54.6
Maintaining navigation.....lump sum	$8,250	$2,417 25	$6,212 25	29.3	75.3
Maintaining traffic.....lump sum	$3,000	$879	$2,259	29.3	75.3
Additional bailing and draining.....lump sum	$750	$675	$675	90	90
Sheeting and bracing used second time, to be deducted.....ft. B. M.		1,236	3,194		
Gross estimate.....	$829,283	$244,618	$618,870	29.7	75.3

"*Contract No.* 67.

"This contract provides for the construction of the canal prism, with two locks and other structures, at Lockport, extending from the west end of contract No. 66 to the east end of contract No. 40, a distance of 0.57 mile. Edward Anderberg, Assistant Engineer, is in charge.

"Contract was awarded to Larkin & Sangster on September 3, 1910. Work was begun October 3, 1910.

"An important feature of this contract is the construction of a 15-foot tunnel, 700 feet long, south of the locks, for the purpose of feeding the hydraulic race, and a 9-foot concrete and steel flume, 280 feet long, which feeds the lower level. The work done before the close of navigation was mainly stripping rock, excavating site of 9-foot flume, demolishing buildings and constructing an air compressor for operation of drills and derricks.

"At the close of navigation excavation of tunnel and lock No. 35 was begun, the tunnel excavation being handled through a shaft

by derrick and dumped in the site of lock No. 35, where a 70-ton Bucyrus shovel and three trains removed it, together with the lock excavation.

"Early in March concreting was begun on the flume and on that part of the north wall of lock No. 35 which is above the present locks. This wall was completed just before the opening of navigation, a concrete bulkhead placed, joining it to the head of the old locks and a timber dam reinforced by stone-filled cribs built in the stop-log recess at the head of the new lock, effectively coffer-damming the lock excavation for the summer. The tunnel excavation was completed in March and the flume forebay at tunnel outlet on May 19, when water was allowed to pass through the hydraulic race. The flume was completed July 24 and on August 24 was tested and water allowed to pass through it to the lower level.

"During the summer excavation was carried on at the sites of locks Nos. 34 and 35, new concrete retaining wall built along Buffalo street, one-half of Main street bridge removed and abutments built and excavation and part of abutments built for Transit street bridge.

"During the coming winter excavation will be made above the locks, the balance of Main street and Transit street bridges constructed and concrete carried on in locks and lower approach wall.

"The principal plant on the work is an air compressor station, one 70-ton Bucyrus shovel, one Thew shovel, 3 dinky trains with outfits, 2 concrete mixers, 2 channeling machines and various drills, derricks, etc.

"The following table summarizes the work completed to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation.....cu. yds.	258,700	110,272	110,272	42.6	42.6
Tunnel excavation.....cu. yds.	6,700	6,028	6,028	90	90
Sheeting and bracing.....ft. B. M.	48,000	9,247	9,247	19.3	19.3
Channeling.....sq. ft.	160,000	28,940	28,940	18.1	18.1
Embankment.....cu. yds.	350	19	19	5.4	5.4
Sawed lumber.....ft. B. M.	9,500	2,547	2,547	26.8	26.8
Round timber bracing.....lin. ft.	3,000	129	129	4.3	4.3
Second-class concrete.....cu. yds.	60,600	10,327	10,327	17	17
Tunnel lining.....cu. yds.	2,900	21	21	0.7	0.7
Reinforced concrete.....cu. yds.	420	314	314	74.8	74.8
Grouted riprap.....cu. yds.	800	25	25	3.1	3.1



BARGE CANAL, CONTRACT No. 40.

View showing substructure for Pendleton guard-gate in the foreground, a revolving excavator and tipple incline operating in the middle distance and a cantilever crane excavating beyond.

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cen of work done to date.
Fourth-class riprap.....cu. yds.	700	30	30	4.3	4.3
12-inch vitrified pipe, laid.....lin. ft.	900	155	155	17.2	17.2
15-inch vitrified pipe, laid.....lin. ft.	900	24	24	2.7	2.7
Metal reinforcement.....lbs.	192,700	92,999	92,999	48.3	48.3
Structural steel.....lbs.	3,428,000	102,068	102,068	3	3
Iron castings, plain.....lbs.	193,800	42,740	42,740	22.1	22.1
Iron castings, machined.....lbs.	38,200	13,835	13,835	36	36
Metal in lock-gates.....lbs.	620,000	221	221	0.1	0.1
Drilling bolt holes in rock.....lin. ft.	7,200	1,231	1,231	17.1	17.1
Fiber ducts.....lin. ft.	4,000	271	271	6.8	6.8
Gate hoists.....No.	6	4	4	66.7	66.7
48-inch valves.....No.	3	3	3	100	100
Maintaining highway traffic.....lump sum	$2,750	$687 50	$687 50	25	25
Maintaining electric railway traffic..lump sum	$600	$150	$150	25	25
Maintaining navigation.....lump sum	$4,000	$1,000	$1,000	25	25
Removing buildings.....No.	20	15	15	75	75
Coffer-dams, pumping, bailing and draining, lump sum	$16,500	$4,125	$4,125	25	25
Gross estima e.....	$1,149,401	$289,040	$289,040	25.1	25.1

"*Contract No.* 40.

"This contract extends from the west end of contract No. 67 in the city of Lockport to Sulphur Springs guard-lock at Pendleton, where it adjoins contract No. 19, a distance of 4.84 miles. Elias H. Anderson, Assistant Engineer, is in charge.

"The contract was let to the United Engineering and Contract- Company of New York in November, 1908.

The principal part of the work during the past year was the excavation of 543,000 cubic yards of earth and rock, of which about 483,000 cubic yards were removed up to May 15, 1911. Ex- vation during the summer months was light, due to the fact that remaining material is practically all under water and so lo- ed that it is really a final shovel cut, and the plant on the con- tract was designed for dry work.

"The principal plant on the work was as follows: Steam-shovel and trains near Prospect street; steam-shovel and double-boom crane near Hinman road; cableway No. 1 west of Hinman road, operated two seasons ago with steam-shovel and operated only within the last few months in connection with hand labor, remov- ing slope above water; cantilever excavator and conveyor; Brown- ing crane excavator with drag bucket and tipple, installed last

winter and operated a month and a half before opening of navigation; steam-shovel and cableway at new guard-gate; steam-shovel and trains near the west end of contract; 8 channeling machines and various drills.

" The outputs of the leading units of plant were as follows:

" Cantilever, 182,000 cubic yards, of which 144,000 cubic yards were excavated up to May 1, most of the material being that which the machine could not remove the first time over.

" Double-boom crane and shovel, 127,000 cubic yards, of which 102,000 cubic yards were excavated during four winter months.

" Shovel and trains at west end of contract, 101,000 cubic yards, in about 5 working months during winter.

"About 90 per cent of the concrete in the new guard-gate was placed; the concrete substructure of Riley's bridge is completed; substructure of Hawley's bridge is under way and excavation is being made for guard-lock and Summit street bridges.

" It is the intention of the contractor to finish the prism excavation during the coming winter.

" The following table shows the status of work to date:

ITEMS OF WORK	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Coffer-dams, pumping, bailing and draining, lump sum	$10,000	$4,000	$5,000	40	50
Clearing.....lump sum	$2,000	$500	$2,000	25	100
Excavation.....cu. yds.	2,341,905	543,153	1,475,082	23.2	63
Sheeting and bracing.....ft. B. M.	20,000	18,365	18,365	91.8	91.8
Channeling.....sq. ft.	430,550	62,266	164,276	15.6	38.2
Forming embankment.....cu. yds.	31,690	3,720	4,908	11.7	15.5
Foundation piles.....lin. ft.	770	378	378	51.4	51.4
Second-class concrete.....cu. yds.	7,419	3,001	3,063	40.5	41.3
Third-class concrete.....cu. yds.	519	198.1	362	38.2	69.8
Reinforced concrete.....cu. yds.	554	124.4	132	22.5	23.8
Wash wall.....cu. yds.	38,508	12,954	13,272	33.6	34.5
Third-class riprap.....cu. yds.	324	6	6	1.9	1.9
Structural steel.....lbs.	627,140	1,209	1,209	0.2	0.2
Metal reinforcement.....lbs.	70,840	18,757	21,766	26.5	30.7
Drilling bolt holes in rock.....lin. ft.	550	400	400	72.7	72.7
Trenching and backfilling for 48-in. pipe.lin. ft.	66	48	48	72.7	72.7
Relaying 48-in. cast iron pipe.....lin. ft.	66	48	48	72.7	72.7
Maintaining navigation.....lump sum	$5,000	$1,000	$2,500	20	50
Maintaining highway traffic.....lump sum	$500	$250	$250	50	50
Ditch excavation.....cu. yds.	38,520	4,445	24,093	11.5	62.6
Gross estimate.....	$2,190,870	$503,268	$1,263,120	23	57.7



BARGE CANAL, CONTRACT NO. 40.

View of a revolving excavator and tipple incline operating in the prism near Pendleton guard-gate.



ERIE CANAL, RESIDENCY NO. 11.

Resident Engineer C. J. McDonough reports as follows:

"This residency extends from the Sulphur Springs guard-lock at Pendleton to and through the city of Buffalo.

"Two contracts are embraced in this residency, viz., contract No. 19 and one not yet advertised, about 2,500 feet long, from Delaware avenue bridge, Tonawanda, to the Niagara river.

"*Contract No.* 19.

"This contract extends from Pendleton guard-lock to Delaware avenue bridge, Tonawanda, a distance of 12.46 miles. The contract was let to the Great Lakes Construction Company and work began May 25, 1907. O. L. Burdett, Assistant Engineer, is in charge.

"The contract is essentially a dredging proposition, extending about 11½ miles along Tonawanda creek and about 1 mile along typical artificial canal.

"Six hundred and forty-three thousand cubic yards were excavated during the year, of which the hydraulic dredge *Niagara* removed 512,000 cubic yards in eight working months, having been laid up four months during the winter. The dipper-dredge *Buffalo* operated eight months, mainly excavating and casting over material which was later handled by the hydraulic dredge. Excavator *Lehigh,* equipped with a Page bucket, was employed eight months (except during the winter) building dikes for hydraulic spoil bank.

"At the close of navigation the dam at McDonald's culvert was rebuilt and two steam-shovels installed in the section between McDonald's culvert and the guard-lock. Marion shovel operated in connection with cableway and Thew shovel operated with Koppel cars and inclines.

"The following structures were built during the year: Tonawanda stream entrance, abutments and crib; Pickard's bridge, new pier and abutments and spans of superstructure interchanged; New Home bridge, raised.

" The following table summarizes the work to date:

ITEMS OF WORK.	Preliminary estimate.	Work done during year.	Total work done to date.	Per cent of work done during year.	Per cent of work done to date.
Excavation, guard-lock to Sta. 6180...cu. yds.	240,000	62,404	212,635	26	88.6
Excavation, Sta. 6180 to Tonawanda...cu. yds.	3,217,000	581,006	2,480,986	18.1	77.1
Sheeting and bracing.....ft. B. M.	974,000	3,446	1,038,241	0.3	100
Forming embankment.....cu. yds.	36,000	5,012	26,501	13.9	73.6
Lining.....cu. yds.	2,200	645	880	29.3	40
Sawed lumber, yellow pine.....ft. B. M.	24,000	760	21,475	3.2	89.5
Sawed lumber, hemlock.....ft. B. M.	40,000	13,8 8	27,636	34.5	69.1
Round timber in cribs.....lin. ft.	16,000	0	17,714	0	100
Stone filling in cribs.....cu. yds.	850	185	370	21.8	43.5
Foundation piles, 20 feet long.....No.	340	39	85	11.5	25
Fender piles, 30 feet long.....No.	40	9	9	22	22
Sheet-piling.....ft. B. M.	44,000	0	8,370	0	19
Second-class concrete.....cu. yds.	15,900	762	12,987	4.8	81.7
Reinforced concrete.....cu. yds.	400	221	365	55.3	91.3
Metal reinforcement.....lbs.	45,770	26,894	42,737	58.8	93.4
First-class masonry coping.....cu. yds.	6	0.9	3.9	15	65
Cobblestone paving.....sq. yds.	95	0	62	0	65
Wooden fencing.....lin. ft.	1,500	1,158	1,158	77	77
Structural steel.....lbs.	257,640	0	243,960	0	95
Removing bridge superstructures....lump sum	$359	$179 50	$359	50	100
Raising bridge superstructures.....lump sum	$3,599	$2,598 48	$2,598 48	72	72
Maintaining traffic.....lump sum	$599	$115 01	$468 42	19	78
Gross estimate.....	$891,401	$153,067	$703,130	17.2	78.9

CONCLUSION.

A statement of the engineering expenses of the division and table of contracts completed during the fiscal year and those in force at its close are hereto appended.

I desire to express my gratitude to you and your deputies for the valuable assistance rendered me in the performance of my duties and also commend to your favorable consideration the faithful services of some two hundred employees of this Division, all of whom have labored effectively in the interests of the Department; also the willing coöperation on the part of the contractors to execute the work as directed by the Department.

Respectfully submitted,

EDWARD J. GOVERN,
Division Engineer.



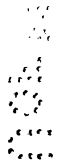
BARGE CANAL, CONTRACT No. 19.

View of a hydraulic dredge working until winter comes and a frozen channel compels a suspension of operations.



BARGE CANAL, CONTRACT No. 19.

View of winter work. As navigation must be maintained during the summer, much of the work has to be done in the winter, when the water can be drained from the channel.



THE FOLLOWING STATEMENTS SHOW THE NAME, RANK AND COMPENSATION OF ENGINEERS IN THE WESTERN DIVISION OF THE DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR, TOGETHER WITH INCIDENTAL EXPENSES FOR THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Ordinary Repairs to Canals — Erie Canal.

Chapter 512, Laws of 1910.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
T. W. Barrally	Division engineer	$350 per month	$1,400 00		$1,400 00
Edward J. Govern	Division engineer	350 per month	2,787 50		2,787 50
J. G. Soergel	Financial clerk	150 per month	750 00		750 00
Frank A. Somers	Financial clerk	150 per month	520 16		520 16
Peter Sheridan	Cashier	150 per month	525 00		525 00
A. B. Williams	Estimate clerk	150 per month	1,800 00		1,800 00
Anna M. Lorscheider	Stenographer	100 per month	1,200 00		1,200 00
Total					$8,982 66

Construction of Barge Canal — Erie Canal.

Chapter 147, Laws of 1903, and amendatory laws.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
T. W. Barrally	Division engineer	$350 per month		$280 14	$280 14
Edw. J. Govern	Division engineer	350 per month		371 75	371 75
Geo. C. Mills	Resident engineer	250 per month	$1,949 40	338 52	2,287 92
H. J. Knoppel	Resident engineer	250 per month	1,866 07	337 09	2,203 16
C. J. McDonough	Resident engineer	250 per month	1,000 00	18 75	1,018 75
J. V. Hogan	Resident engineer	250 per month	1,764 69	87 69	1,852 38
B. E. Failing	Resident engineer	225 per month	2,700 00	179 35	2,879 35
O. F. Bellows	Resident engineer	225 per month	2,700 00	55 63	2,755 63
Thos. J. Morrison	Resident engineer	225 per month	108 87		108 87
Chas. A. Ingersoll	Resident engineer	225 per month	900 00	100 91	1,000 91
C. J. McDonough	Resident engineer	225 per month	1,574 85	32 84	1,607 69
C. J. McDonough	Resident engineer	200 per month	200 00	11 65	211 65
F. J. Wilbur	Assistant engineer	6 00 per day	1,878 00		1,878 00
J. S. Summers	Assistant engineer	6 00 per day	1,890 00	461 24	2,351 24
F. T. Marsh	Assistant engineer	6 00 per day	1,890 00	46 60	1,936 60
D. E. Bellows	Assistant engineer	6 00 per day	1,998 00	89 65	2,087 65
B. L. G. Rees	Assistant engineer	6 00 per day	1,908 00	132 07	2,040 07
H. R. Wickham	Assistant engineer	6 00 per day	1,944 00	26 61	1,970 61
L. G. Fisher	Assistant engineer	6 00 per day	1,878 00	25 04	1,903 04
G. M. Briggs	Assistant engineer	6 00 per day	426 00	37 70	463 70
E. P. Strowger	Assistant engineer	6 00 per day	2,016 00	189 20	2,205 20
H. J. Hemstreet	Assistant engineer	6 00 per day	1,878 00	115 64	1,993 64
A. S. Milinowski	Assistant engineer	6 00 per day	1,896 00	100 88	1,996 88
Arthur S. Whitbeck	Assistant engineer	6 00 per day	1,878 00	159 49	2,037 49
Geo. D. Kellogg	Assistant engineer	6 00 per day	1,902 00	937 39	2,839 39
R. H. Merrill	Assistant engineer	6 00 per day	1,908 00	398 42	2,306 42
Elias H. Anderson	Assistant engineer	6 00 per day	1,908 00	316 03	2,224 03
Edward Anderberg	Assistant engineer	6 00 per day	1,896 00	4 34	1,900 34
O. L. Burdett	Assistant engineer	6 00 per day	1,550 00	149 30	1,699 30
John S. Clancy	Assistant engineer	6 00 per day	1,740 00	4 58	1,744 58

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
W. A. Lafler	Assistant engineer	$6 00 per day	$1,344 00	$111 33	$1,455 33
G. C. Britton	Assistant engineer	6 00 per day	642 00		642 00
Carl Ashley	Assistant engineer	6 00 per day	234 00	10 67	244 67
C. L. Baldwin	Assistant engineer	6 00 per day	630 00	58 91	688 91
W. T. Huber	Assistant engineer	6 00 per day	318 00	7 60	325 60
C. R. Waters	Assistant engineer	6 00 per day	822 00	103 35	925 35
C. D. Murray	Assistant engineer	6 00 per day	1,002 00	70 88	1,072 88
Harold N. Metzger	Assistant engineer	5 50 per day	632 50	22 82	655 32
Francis W. Madigan	Assistant engineer	5 50 per day	583 00	69 22	652 22
C. E. Elmendorf	Assistant engineer	5 50 per day	588 50		588 50
G. Edson	Assistant engineer	5 50 per day	577 50		577 50
O. L. Burdett	Assis ant engineer	5 00 per day	260 00	12 60	272 60
C. G. Britton	Assistant engineer	5 00 per day	725 00		725 00
C. L. Baldwin	Assistant engineer	5 00 per day	735 00	253 64	988 64
W. T. Huber	Assistan engineer	5 00 per day	980 00	118 94	1,098 94
C. R. Waters	Assistant engineer	5 00 per day	525 00	117 35	642 35
J. V. Hogan	Assistant engineer	5 00 per day	650 00	12 69	662 69
J. G. Soergel	Financial clerk	150 per month		23 82	23 82
F. V. Searles	Estimate clerk	150 per month	150 00	8 41	158 41
F. V. Searles	Estimate clerk	126 per month	1,357 28	72 83	1,430 11
Dora Hamilton	Confidential stenographer	125 per month	312 50		312 50
Marion Bradley	Stenographer	75 per month	21 77		21 77
A. Edith Schoelles	Stenographer	60 per month	540 00		540 00
A. Edith Schoelles	Stenographer	50 per month	155 16		155 16
Wm. H. Kehoe	Chauffeur	100 per month	350 00	10 33	360 33
H. G. McKelvey	Draftsman	5 00 per day	1,510 00		1,510 00
Chas. R. Zorsch	Draftsman	5 00 per day	1,565 00	4 90	1,569 90
H. Clyde Roe	Draftsman	5 00 per day	1,565 00	6 40	1,571 40
H. H. Stickney, Jr	Draftsman	5 00 per day	1,700 00	59 80	1,759 80
C. E. Elmendorf	Draftsman	5 00 per day	905 00		905 00
G. C. Britton	Draftsman	5 00 per day	320 00		320 00
A. B. Chappell	Draftsman	5 00 per day	1,590 00		1,590 00
W. H. Dernell	Draftsman	5 00 per day	1,225 00		1,225 00
T. B. Smith	Draftsman	5 00 per day	320 00		320 00
C. J. Alber	Draftsman	5 00 per day	1,565 00		1,565 00
H. W. Lockwood	Draftsman	5 00 per day	1,615 00		1,615 00
C. D. Sniggs	Draftsman	5 00 per day	150 00		150 00
W. H. Dernell	Draftsman	4 50 per day	381 00		381 00
P. L. Arnold	Draftsman	120 per month	294 19		294 19
W. J. Burns	Tracer	75 per month	890 00		890 00
James G. Allan	Tracer	75 per month	900 00		900 00
R. J. Curran	Tracer	75 per month	900 00	5 05	905 05
A. P. Mussi	Leveler	5 00 per day	1,210 00		1,210 00
Francis W. Madigan	Leveler	5 00 per day	1,040 00	31 12	1,071 12
Alfred E. Roche	Leveler	5 00 per day	1,634 00	117 18	1,751 18
Harold N. Metzger	Leveler	5 00 per day	1,095 00	149 44	1,244 44
C. R. Waters	Leveler	5 00 per day	400 00	51 28	451 28
J. B. Barrett	Leveler	5 00 per day	585 00		585 00
J. J. Hynes, Jr	Leveler	5 00 per day	350 00		350 00
C. L. Baldwin	Leveler	5 00 per day	320 00	29 70	349 70
G. Edson	Leveler	5 00 per day	1,040 00		1,040 00
H. J. Simmelink	Leveler	5 00 per day	395 00		395 00
George S. Haight	Leveler	5 00 per day	1,185 00	47 58	1,232 58
L. R. Barnes	Leveler	5 00 per day	1,585 00	240 77	1,825 77
Wm. T. Huber	Leveler	5 00 per day	325 00	26 17	351 17
C. J. Bean	Leveler	5 00 per day	1,215 00		1,215 00
P. L. Arnold	Leveler	5 00 per day	1,260 00		1,260 00
A. P. Mussi	Leveler	4 50 per day	363 00		363 00
H. J. Simmelink	Leveler	4 50 per day	1,057 50		1,057 50
Bruce L. Hall	Leveler	4 50 per day	355 50		355 50
Geo. S. Haight	Leveler	4 50 per day	363 00		363 00
Harry M. Nelson	Leveler	4 50 per day	308 00		308 00
Rob't D. Cameron	Leveler	4 50 per day	1,408 50	17 98	1,426 48
R. C. Georger	Leveler	4 50 per day	1,408 50		1,408 50
John B. Doyle	Leveler	4 50 per day	301 50		301 50
C. J. Bean	Leveler	4 50 per day	371 50		371 50
C. H. Swick	Leveler	4 50 per day	983 00	18 57	1,001 57
Ely Gamse	Leveler	4 50 per day	567 00	111 15	678 15
Fred C. Facer	Rodman	4 00 per day	944 00	36 65	980 65
M. F. Dullea	Rodman	4 00 per day	1,276 00		1,276 00
D. M. Miner	Rodman	4 00 per day	940 00		940 00
M. Tiefenbrun	Rodman	4 00 per day	328 00		328 00

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
J. W. Howe	Rodman	$4 00 per day	$1,272 00		$1,272 00
A. O. Peabody	Rodman	4 00 per day	796 00		796 00
E. D. Bean	Rodman	4 00 per day	432 00		432 00
D. T. Simpson	Rodman	4 00 per day	212 00	$1 14	213 14
W. G. Dubey	Rodman	4 00 per day	1,136 00		1,136 00
Clarence M. Colony	Rodman	4 00 per day	972 00		972 00
L. P. Slade	Rodman	4 00 per day	316 00		316 00
Benj. Krotinger	Rodman	4 00 per day	752 00		752 00
Jacob Bendel	Rodman	4 00 per day	492 00		492 00
Wm. Robinson	Rodman	4 00 per day	446 50		446 50
J. Lyons	Rodman	4 00 per day	451 50		451 50
John B. Doyle	Rodman	3 50 per day	875 00		875 00
Fred C. Facer	Rodman	3 50 per day	284 00		284 00
D. M. Miner	Rodman	3 50 per day	284 00		284 00
M. Tiefenbrun	Rodman	3 50 per day	812 00		812 00
H. F. Bronson	Rodman	3 50 per day	234 50		234 50
Bruce L. Hall	Rodman	3 50 per day	822 50		822 50
R. L. White	Rodman	3 50 per day	42 00		42 00
Henry Heffernan	Rodman	3 50 per day	1,092 00	17 70	1,109 70
W. J. Willis	Rodman	3 50 per day	1,106 00		1,106 00
J. J. Hynes, Jr.	Rodman	3 50 per day	857 50		857 50
J. H. Bovier	Rodman	3 50 per day	1,067 50		1,067 50
D. T. Simpson	Rodman	3 50 per day	829 50		829 50
T. S. Fillebrown	Rodman	3 50 per day	210 00		210 00
Thos. E. McGrath	Rodman	3 50 per day	507 50		507 50
E. G. Vanderwerken	Rodman	3 50 per day	493 50		493 50
Jesse F. Back	Rodman	3 50 per day	759 00	10 87	769 87
A. A. Levison	Rodman	3 50 per day	567 00		567 00
Paul A. Volcker	Rodman	3 50 per day	199 50		199 50
A. M. Kennedy	Rodman	3 50 per day	28 00		28 00
J. L. Ames	Rodman	3 50 per day	574 00	9 72	583 72
H. F. Hughes	Inspector	5 00 per day	1,630 00	435 74	2,065 74
W. W. Barclay	Inspector	5 00 per day	1,695 00	116 60	1,811 60
C. M. Leet	Inspector	5 00 per day	1,620 00	43 85	1,663 85
E. L. Wick	Inspector	5 00 per day	1,660 00		1,660 00
Thos. McMorrow	Inspector	5 00 per day	1,640 00		1,640 00
Geo. M. Harrer	Inspector	5 00 per day	265 00		265 00
E. V. Allendorph	Inspector	5 00 per day	1,405 00		1,405 00
Geo. M. Harrer	Inspector	4 50 per day	1,226 00		1,226 00
J. O. Donnelly	Inspector	4 00 per day	688 00		688 00
Frederick T. Lawton	Inspector	3 50 per day	311 50		311 50
T. B. Bowes	Foreman of borings	4 00 per day	672 00		672 00
Fred H. Palmer	Foreman of borings	4 00 per day	1,244 00		1,244 00
H. Kramer	Foreman of borings	4 50 per day	777 50	10 02	787 52
Floyd C. Oatman	Boatman	3 00 per day	345 00		345 00
H. J. Whitman	Boatman	3 00 per day	975 00	61 29	1,036 29
D. S. Hollenbeck	Boatman	3 00 per day	345 00	4 08	349 08
Chas. V. Ford	Boatman	3 00 per day	561 00		561 00
Edwin N. Parker	Boatman	3 00 per day	546 00		546 00
Irving Whitney	Boatman	3 00 per day	597 00		597 00
Fred Unger	Boatman	3 00 per day	573 00		573 00
O. J. Townsend	Boatman	3 00 per day	369 00		369 00
Wm. F. Guenther	Boatman	3 00 per day	933 00		933 00
E. Hassig	Boatman	3 00 per day	606 00		606 00
John B. Sweeney	Boatman	5 00 per day	42 00		42 00
E. A. Faille	Boatman	3 00 per day	561 00		561 00
Fred B. Sherman	Boatman	3 00 per day	414 00		414 00
C. J. Lahey	Boatman	3 00 per day	570 00		570 00
James A. Lair	Boatman	3 00 per day	396 00	10 56	406 56
Martin Scanlon	Boatman	3 00 per day	306 00		306 00
Edw. J. Burns	Boatman	3 00 per day	291 00		291 00
E. J. Greener	Chainman	3 00 per day	954 00		954 00
W. N. Langworthy	Chainman	3 00 per day	507 00		507 00
D. T. Simpson	Chainman	3 00 per day	78 00		78 00
S. A. Miller	Chainman	3 00 per day	792 00		792 00
L. H. Brandt	Chainman	3 00 per day	783 00		783 00
C. N. Budlong	Chainman	5 00 per day	366 00		366 00
A. F. Truex	Chainman	3 00 per day	237 00		237 00
M. Abramson	Chainman	3 00 per day	876 00		876 00
H. J. O'Connor	Chainman	3 00 per day	681 00		681 00
J. D. Webster	Chainman	3 00 per day	942 00	23 64	965 64

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
James M. Wilson	Chainman	$3 00 per day	$810 00		$810 00
H. A. Ingersoll	Chainman	3 00 per day	717 00		717 00
A. W. Balliett	Chainman	3 00 per day	732 00		732 00
F. G. Hempel	Chainman	3 00 per day	240 00		240 00
P. M. Howe	Chainman	3 00 per day	240 00		240 00
C. J. Donaher	Chainman	3 00 per day	417 00		417 00
J. J. Sullivan	Chainman	3 00 per day	315 00		315 00
F. J. O'Connor	Chainman	3 00 per day	252 00		252 00
F. G. Kimball	Chainman	3 00 per day	237 00		237 00
H. A. Shafer	Chainman	3 00 per day	240 00	$23 05	263 05
W. N. Langworthy	Chainman	2 50 per day	225 00		225 00
Wm. H. Barhyte	Chainman	2 50 per day	265 00		265 00
Thos. E. McGrath	Chainman	2 50 per day	65 00		65 00
S. A. Miller	Chainman	2 50 per day	132 50		132 50
W. B. Green	Chainman	2 50 per day	272 50		272 50
L. T. Phillips	Chainman	2 50 per day	310 00		310 00
L. H. Brandt	Chainman	2 50 per day	130 00		130 00
C. N. Budlong	Chainman	2 50 per day	130 00		130 00
A. F. Truex	Chainman	2 50 per day	592 50		592 50
Guy L. Smith	Chainman	2 50 per day	167 50		167 50
W. J. Ryan	Chainman	2 50 per day	790 00		790 00
M. Abramson	Chainman	2 50 per day	65 00		65 00
H. J. O'Connor	Chainman	2 50 per day	130 00		130 00
James M. Wilson	Chainman	2 50 per day	130 00		130 00
H. A. Ingersoll	Chainman	2 50 per day	204 50		204 50
Frank E. Simpson	Chainman	2 50 per day	65 00		65 00
A. W. Balliett	Chainman	2 50 per day	212 00		212 00
Leland Pfohl	Chainman	2 50 per day	100 00		100 00
Fred C. Davis	Chainman	2 50 per day	795 00		795 00
Carl L. Weil	Chainman	2 50 per day	180 00		180 00
James D. Boucher	Chainman	2 50 per day	427 50	88 83	516 33
F. G. Hempel	Chainman	2 50 per day	527 50		527 50
P. M. Howe	Chainman	2 50 per day	520 00		520 00
W. N. Whitney	Chainman	2 50 per day	167 50		167 50
Wm. H. Saunders	Chainman	2 50 per day	62 50		62 50
C. J. Donaher	Chainman	2 50 per day	407 50		407 50
A. E. Williams	Chainman	2 50 per day	287 50		287 50
J. J. Sullivan	Chainman	2 50 per day	365 00		365 00
Wm. F. Lysett	Chainman	2 50 per day	262 50	2 84	265 34
F. J. O'Connor	Chainman	2 50 per day	506 00		506 00
F. G. Kimball	Chainman	2 50 per day	427 50		427 50
H. A. Shafer	Chainman	2 50 per day	425 00		425 00
G. D. Wetsel	Chainman	2 50 per day	152 50		152 50
E. J. Trimble	Chainman	2 50 per day	232 50		232 50
T. Beaupre	Chainman	2 50 per day	627 50		627 50
Edw. Dowd	Chainman	2 50 per day	392 50		392 50
Frank N. Sisson	Chainman	2 50 per day	275 00		275 00
C. F. Doty	Chainman	2 50 per day	257 50		257 50
C. T. Smith	Chainman	2 50 per day	330 00		330 00
A. E. Williams	Axeman	2 50 per day	93 50		93 50
Finla L. Jones	Axeman	2 50 per day	733 50		733 50
Frank N. Sisson	Axeman	2 50 per day	448 50		448 50
J. J. Sullivan	Axeman	2 50 per day	88 50		88 50
T. J. Smith	Axeman	2 50 per day	262 50		262 50
F. J. O'Connor	Axeman	2 50 per day	88 50		88 50
F. G. Kimball	Axeman	2 50 per day	88 50		88 50
H. A. Shafer	Axeman	2 50 per day	88 50		88 50
E. J. Trimble	Axeman	2 50 per day	88 50		88 50
T. Beaupre	Axeman	2 50 per day	88 50		88 50
Geo. E. Merry	Axeman	2 50 per day	713 50		713 50
Wm. H. Barhyte	Axeman	2 50 per day	453 50		453 50
Lynn H. Barrows	Axeman	2 50 per day	711 00		711 00
Wm. F. Lysett	Axeman	2 50 per day			
A. E. Williams	Axeman	2 00 per day	52 00		52 00
Finla L. Jones	Axeman	2 00 per day	60 00		60 00
Frank N. Sisson	Axeman	2 00 per day	52 00		52 00
J. J. Sullivan	Axeman	2 00 per day	52 00		52 00
F. G. Hempel	Axeman	2 00 per day	52 00		52 00
C. F. Doty	Axeman	2 00 per day	416 00		416 00
T. J. Smith	Axeman	2 00 per day	52 00		52 00
W. B. Green	Axeman	2 00 per day	430 00		430 00
F. J. O'Connor	Axeman	2 00 per day	52 00		52 00

Construction of Barge Canal — Erie Canal — (Continued).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
F. G. Kimball	Axeman	$2 00 per day	$52 00		$52 00
H. A. Shafer	Axeman	2 00 per day	52 00		52 00
E. J. Trimble	Axeman	2 00 per day	52 00		52 00
T. Beaupre	Axeman	2 00 per day	52 00		52 00
P. M. Howe	Axeman	2 00 per day	52 00		52 00
Chas. J. Donaher	Axeman	2 00 per day	52 00		52 00
Geo. E. Merry	Axeman	2 00 per day	52 00		52 00
Wm. H. Barhyte	Axeman	2 00 per day	52 00		52 00
Lynn H. Barrows	Axeman	2 00 per day	52 00		52 00
C. T. Smith	Axeman	2 00 per day	320 00		320 00
Wm. F. Lysett	Axeman	2 00 per day	384 00		384 00
J. J. Bruckel	Axeman	2 00 per day	102 00		102 00
Chas. Watson	Axeman	2 00 per day	108 00		108 00
Henry Engler	Laborer	2 00 per day	430 00		430 00
J. B. Roberts	Laborer	2 00 per day	634 00		634 00
Michael Unger	Laborer	2 00 per day	660 00		660 00
E. A. Close	Laborer	2 00 per day	150 00		150 00
Douglas Hall	Laborer	2 00 per day	78 00		78 00
Wm. H. Saunders	Laborer	2 00 per day	308 00		308 00
James D. Boucher	Laborer	2 00 per day	186 00		186 00
Horace Stewart	Laborer	2 00 per day	242 00		242 00
W. T. Burke	Laborer	2 00 per day	130 00		130 00
Patrick O'Donnell	Laborer	2 00 per day	338 00		338 00
Joseph Berger	Laborer	2 00 per day	282 00		282 00
E. J. Bullis	Laborer	2 00 per day	312 00		312 00
M. S. Steinfeld	Laborer	2 00 per day	294 00		294 00
Geo. Milner	Laborer	2 00 per day	388 00		388 00
E. R. Shutt	Laborer	2 00 per day	88 00		88 00
Martin Kirsch	Laborer	2 00 per day	120 00		120 00
C. E. Crowley	Laborer	2 00 per day	34 00		34 00
C. L. Foster	Laborer	2 00 per day	606 00		606 00
C. T. Smith	Laborer	2 00 per day	54 00		54 00
A. A. Watrous	Laborer	2 00 per day	332 00		332 00
John Ritzenthaler	Laborer	2 00 per day	386 00		386 00
B. A. McDonald	Laborer	2 00 per day	126 00		126 00
L. T. Phillips	Laborer	2 00 per day	270 00		270 00
E. W. Horswell	Laborer	2 00 per day	278 00		278 00
O. M. Punch	Laborer	2 00 per day	312 00		312 00
W. J. Kewin	Laborer	2 00 per day	349 00		349 00
Edward Welsh	Laborer	2 00 per day	220 00		220 00
G. W. Doud	Laborer	2 00 per day	114 00		114 00
H. C. Wilcox	Laborer	2 00 per day	312 00		312 00
J. H. Madigan	Laborer	2 00 per day	554 00		554 00
Joseph J. Darcey	Laborer	2 00 per day	230 00	$5 84	235 84
C. R. Kirby	Laborer	2 00 per day	316 00		316 00
R. Spiegel	Laborer	2 00 per day	332 00		332 00
A. B. Curran	Laborer	2 00 per day	240 00		240 00
Fred C. Babcock	Laborer	2 00 per day	236 00	5 84	241 84
Peter Arnold	Laborer	2 00 per day	568 00		568 00
Leo G. Cooley	Laborer	2 00 per day	586 00		586 00
Edward McGurn	Laborer	2 00 per day	392 00		392 00
John Finnegan	Laborer	2 00 per day	84 00		84 00
J. Lewis Myers	Laborer	2 00 per day	52 00		52 00
C. Kumro	Laborer	2 00 per day	554 00		554 00
Edw. L. Kropp	Laborer	2 00 per day	26 00		26 00
Jno. B. Webb, Jr.	Laborer	2 00 per day	212 00		212 00
Martin Hickey	Laborer	2 00 per day	394 00		394 00
John T. Carroll	Laborer	2 00 per day	14 00		14 00
Ira J. Foster	Laborer	2 00 per day	18 00		18 00
James Duffy	Laborer	2 00 per day	228 00		228 00
Chas. Hunt	Laborer	2 00 per day	194 00		194 00
Henry C. Whalen	Laborer	2 00 per day	194 00		194 00
Wm. Marshall	Laborer	2 00 per day	466 00		466 00
Hiram J. Wolfe	Laborer	2 00 per day	140 00		140 00
Fred J. Converse	Laborer	2 00 per day	138 00		138 00
J. Hart	Laborer	2 00 per day	34 00		34 00
C. H. Schlee	Laborer	2 00 per day	20 00		20 00
Wm. Harris	Laborer	2 00 per day	402 00		402 00
E. B. Male	Laborer	2 00 per day	412 00		412 00
F. B. Engert	Laborer	2 00 per day	372 00		372 00
Geo. R. Shea	Laborer	2 00 per day	234 00		234 00
Rendell Rhody	Laborer	2 00 per day	240 00		240 00
L. R. Cooper	Laborer	2 00 per day	106 00		106 00

Construction of Barge Canal — Erie Canal — (Concluded).

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
G. A. Lewis	Laborer	$2 00 per day	$36 00		$36 00
E. C. Warren	Laborer	2 00 per day	36 00		36 00
E. W. Burke	Laborer	2 00 per day	36 00		36 00
Richard Maxwell	Laborer	2 00 per day	384 00		384 00
Wm. A. Beal, Jr	Laborer	2 00 per day	406 00		406 00
R. N. Hale	Laborer	2 00 per day	340 00		340 00
John Doud	Laborer	2 00 per day	178 00		178 00
Geo. W. Ryan	Laborer	2 00 per day	178 00		178 00
F. J. Madden	Laborer	2 00 per day	314 00		314 00
Wm. Flynn	Laborer	2 00 per day	342 00		342 00
Arthur Poyser	Laborer	2 00 per day	372 00		372 00
J. F. McNulty	Laborer	2 00 per day	354 00		354 00
B. McCabe	Laborer	2 00 per day	326 00		326 00
E. M. Ryan	Laborer	2 00 per day	314 00		314 00
H. Carson	Laborer	2 00 per day	226 00		226 00
H. B. Reisterer	Laborer	2 00 per day	352 00		352 00
T. J. Smith	Laborer	2 00 per day	76 00		76 00
H. E. Rose	Laborer	2 00 per day	360 00		360 00
T. J. Griffin	Laborer	2 00 per day	238 00		238 00
W. A. Sullivan	Laborer	2 00 per day	270 00		270 00
A. C. Kenny	Laborer	2 00 per day	228 00		228 00
J. P. Henry, Jr	Laborer	2 00 per day	304 00		304 00
J. Westbrook	Laborer	2 00 per day	314 00		314 00
J. Henry Madden	Laborer	2 00 per day	322 00		322 00
N. J. O'Mealia	Laborer	2 00 per day	324 00		324 00
Edward Fitzgerald	Gage reader	7 00 per month	49 00		49 00
Jacob Snell, Jr	Gage reader	6 00 per month	72 00		72 00
Carl Tuscher	Gage reader	5 00 per month	60 00		60 00
C. Henry Harrison	Gage reader	5 00 per month	60 00		60 00
Martin Hunkley	Gage reader	5 00 per month	30 00		30 00
P. J. Slavin	Gage reader	5 00 per month	60 00		60 00
Wm. J. Swartz	Gage reader	5 00 per month	60 00		60 00
					$205,018 52
Incidental Expenses.					
Instruments, tools and appliances				$438 59	
Office rent				3,587 89	
Fuel and light				491 00	
Stationery and printing				359 44	
Postage				445 44	
Telephone and telegraph				1,489 22	
Miscellaneous				22,136 36	
					28,927 94
Total					$233,946 46

Georgia Street Bridge, Buffalo.

Chapter 452, Laws of 1909.

NAME.	Rank.	Rate of compensation.	Services.	Travel.	Total.
F. V. Searls	Estimate clerk	$126 per month	$28 72	$24 22	$52 94
Walter G. Dubey	Rodman	4 00 per day	128 00		128 00
Total					$180 94

SUMMARY.

The foregoing tables are summarized as follows:

Ordinary Repairs to Canals.

1. Erie canal, chapter 512, Laws of 1910	$8,982 66

Construction of Barge Canal.

2. Erie canal, chapter 147, Laws of 1903, and amendatory laws	233,946 46

Special Work.

3. Construction of Georgia street bridge, Buffalo, chapter 452, Laws of 1909	180 94
Total	$243,110 06

TABLE OF CONTRACTS COMPLETED ON THE WESTERN DIVISION DURING THE FISCAL YEAR ENDED SEPTEMBER 30, 1911.

Special Work.

CONTRACTOR.	Date of contract.	Character of work.	Act.		Engineer's preliminary estimate.	Contract price.	Final payment.
			Chap.	Year.			
Lupfer & Remick	Jan. 29, 1910	Georgia street bridge, Buffalo	452	1909	$18,371 00	$18,121 00	$17,164 70

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Final payment.
Butler Bros. Construction Co.	Dec. 5, 1908	Contract No. 41, Erie canal — Irondequoit creek crossing	$383,190 00	$273,237 50	$241,644 00

TABLE OF CONTRACTS PENDING ON THE WESTERN DIVISION, SEPTEMBER 30, 1911.

Construction of Barge Canal.

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work to September 30, 1911.
Frank A. Maselli	May 3, 1905	Contract No. 6, Erie canal — Buffalo road, southwest of Rochester, to near South Greece	$1,381,662 00	$1,026,549 80	$1,025,710 00
Thos. Crimmins Contracting Co	Mar. 18, 1908	Contract No. 9, Erie canal — Eagle Harbor to Beal's bridge	724,014 00	803,297 18	647,120 00
Great Lakes Construction Co	Nov. 26, 1906	Contract No. 19, Erie canal — Sulphur Springs guard-lock to Ellicott creek	1,038,245 00	891,401 16	703,130 00
Lane Brothers Co	April 17, 1910	Contract No. 21, Erie canal — Genesee river to near N. Y. C. bridge	1,475,900 00	1,323,150 00	474,580 00
Millard & Lupton Co	Aug. 18, 1909	Contract No. 23, Erie canal — Kings Bend to Genesee river	2,166,600 00	1,808,797 00	660,380 00
United Engineering & Contracting Co	Nov. 27, 1908	Contract No. 40, Erie canal — Locks at Lockport to Sulphur Springs guard-lock	2,516,743 00	2,190,870 30	1,263,120 00
Crowell-Sherman-Stalter Co	Nov. 30, 1908	Contract No. 47, Erie canal — Town of Galen to Lyons	1,434,148 00	1,279,327 60	720,590 00
Crowell-Sherman-Stalter Co	Dec. 29, 1910	Contract No. 48, Erie canal — Near N. Y. C. & H. R. R. R. crossing at Lyons to near West Shore R. R. crossing at East Newark	1,626,811 50	1,697,911 50	75,970 00
Merritt Construction Co	Feb. 21, 1910	Contract No. 49, Erie canal — Palmyra to Wayne-Monroe county line	765,679 00	750,687 75	270,720 00
Empire Engineering Corporation	Aug. 6, 1908	Contract No. 60, Erie canal — Near South Greece to near Adams Basin	1,267,301 60	1,489,247 83	1,184,160 00
Cleveland & Sons Co	Oct. 13, 1908	Contract No. 61, Erie canal — Near Adams Basin to Monroe-Orleans county line	1,000,219 00	1,088,890 03	577,240 00
I. M. Ludington's Sons, Inc	Aug. 11, 1910	Contract No. 62, Erie canal — Monroe-Orleans county line to Eagle Harbor	2,151,470 00	2,347,836 00	587,330 00
H. S. Kerbaugh, Inc	June 3, 1910	Contract No. 63, Erie canal — Wayne-Monroe county line to Kings Bend	2,184,083 00	2,045,826 90	591,220 00
Empire Engineering Corporation	Aug. 6, 1908	Contract No. 64, Erie canal — Near Prospect street, Medina, to near Gasport	1,207,930 00	1,335,433 78	695,080 60
Empire Engineering Corporation	Sept. 22, 1908	Contract No. 66, Erie canal — Near Gasport to near locks at Lockport	751,039 00	821,032 72	618,870 00
Larkin & Sangster	Sept. 3, 1910	Contract No. 67, Erie canal — Locks at Lockport.	1,290,880 00	1,149,401 25	289,040 00
Receivers of J. B. & J. M. Cornell Co	Mar. 1, 1910	Contract No. 75, Erie canal — Guard-gate superstructures on contracts Nos. 60, 61 and 64	39,525 00	42,917 00	

TABLE OF CONTRACTS PENDING ON THE WESTERN DIVISION, SEPTEMBER 30, 1911 — (*Concluded*).

Construction of Barge Canal — (Concluded).

Chapter 147, Laws of 1903, and amendatory laws.

CONTRACTOR.	Date of contract.	Character of work.	Engineer's preliminary estimate.	Contract price, as affected by alterations.	Value of work to September 30, 1911.
The T. A. Gillespie Co	Dec. 23, 1910	Contract No. 76, Erie canal — Near West Shore R. R. crossing at East Newark to about one-half mile east of Port Gibson	$1,504,776 60	$1,512,011 15	$353,260 00
The T. A. Gillespie Co	Dec. 23, 1910	Contract No. 77, Erie canal — About one-half mile east of Port Gibson to about one-half mile west of Palmyra	1,790,672 50	1,669,765 50	412,600 00
Groton Bridge Co	Dec. 7, 1910	Contract No. 82, Erie canal — Highway bridge superstructures within the limits of contract No. 21	27,235 00	28,841 50	8,330 00

Report of Tests

Report of the Land Bureau

REPORT OF TESTS.

TESTING LABORATORY — STATE HALL.

ALBANY, N. Y., *October* 2, 1911.

Hon. JOHN A. BENSEL, *State Engineer and Surveyor:*

Sir.— I have the honor to submit the following report of the work of the testing laboratory of your Department for the fiscal year ended September 30, 1911.

The work of the year has been more than simply routine, and, besides the regular testing of cements, tests are now being made of sand as well as cements; and field inspection of concrete materials is also being made. Many special tests of considerable variety have made the work of particular interest and value. The inspection of cement at the mills has greatly increased the work of the bureau.

CEMENT TESTS.

The routine work of testing cement has been large during the past year, because of the great amount of work being done upon the Barge canal and upon the public highways. The transfer of highway work to the Highway Commission resulted in the Commission placing the necessary number of men in this laboratory to make the tests on cement proposed for use on highways. The supervision of their work was left with the undersigned. The work done also includes, as for several years past, a large number of tests made for work under the direction of the State Architect. Although the laboratory has been enlarged several times, the work at times required the full capacity of the laboratory, especially when field work was in full swing during the summer months. The reports of tests made do not include those made by the representatives of the Department of Highways.

During the past year there have been submitted to this laboratory for tests 538 lots of cement samples, consisting of a total of

10,211 samples. These samples represented 620,076 barrels of cement, of which 94.2 per cent were for the Barge canal and 5.8 per cent were for the State Architect.

The inspection of cement at the mill permits the taking of a smaller proportion of samples to the number of barrels represented. The larger part of the work is through mill inspection for, of the total number of barrels of cement tested, only 6,585 barrels were tested for the Barge canal after delivery upon the work.

Each sample submitted, mixed in the proportion of one part cement to three parts standard quartz sand, was tested for tensile strength at the ends of 7 and 28 days. In addition to the tests for tensile strength, each lot of samples was given tests for fineness and grinding, for initial and hard sets, for specific gravity and for soundness by means of the steam tests, the normal-water test and the normal-air test. Frequently the cements are completely analyzed and are especially checked for sulphuric anhydride ($S O_3$) and magnesia (Mg O).

The method of testing is practically that recommended by the American Society of Civil Engineers. The method of analysis used is that recommended by the committee of the New York Section — Society for Chemical Industry.

At the end of the 7-day tests, all results obtained on tests of samples of cement proposed for use on Barge canal work are reported to Mr. Alexander E. Kastl, Special Deputy State Engineer, and, if thought best, are held for the 28-day tests, the lots being accepted or rejected according as the results show that the cement passes or fails in the tests. The reports of all tests of cement for all other work (except Barge canal and highway work) are submitted to the Deputy State Engineer. All reports of tests for the Highway Commission are made to the Engineer in charge of the Bureau of Research.

Our method of testing each sample separately for tensile strength has proven very satisfactory; in fact, by means of it, much poor cement has been discovered which would have stood the tests, had all of the samples of the lot been blended. This method, however, makes necessary a larger equipment and a more complete system of operation than is necessary under the general method of testing a blended sample. The effort has been made to maintain

as complete a laboratory with as little expense as possible; and it has been acknowledged that the laboratory and its results are so complete as to be placed by experts as being among the best in the country.

The specifications for cement follow closely those recommended by the American Society for Testing Materials — varying from them only in some minor details.

Of the cement tested and proposed for use, all was Portland cement. The brands represented are about the same as heretofore and consist of 20 American Portland cements. Of the brands, 7 were manufactured in New York, 10 in Pennsylvania, and 3 in New Jersey. Fifty and six-tenths per cent of all cement tested was made in New York state.

During the year 83 series of special tests were made. For these about 1,600 briquettes were made. Among these were tests for the effect a heavy oil would have on a cement mortar. Tests were also made of artificially proportioned and graded sands, in order to learn more of the effect of good grading.

Mill inspection.— In addition to the regular method of sampling, as already described in this report, it has been found advisable to sample cement proposed for use on the Barge canal, at the various mills. When there is enough cement to warrant doing so, an inspector is sent to a cement mill to sample cement and inspect shipments. The method of carrying on this work is as follows: The inspector takes samples from the various parts of the bin; each sample is shipped to the Testing Laboratory at Albany by the same method as described and also is tested in the same way. The endeavor is to obtain from the sampling and the testing of these samples the "run of the product." As soon as the samples are taken the inspector places the bin of cement under the seal of this Department and the bin is so sealed that no cement can be added to or taken from it without the breaking of the seal. When the results of the tests have been secured, the reports are made in the usual way, and then, if the cement is accepted, the bin of cement is assigned to the contract which may have placed an order for the cement. When the contractor needs cement, the inspector at the mill breaks the seal on the bin, inspects the loading of the car or cars, seals these with the Depart-

ment seal and then reseals the bin of cement. A notice of shipment is forwarded to the laboratory and the resident engineer in charge of the contract to which the cement has been assigned. When the car or cars arrive on the work, the seal of the Department must be broken by the resident engineer or his representative, otherwise the lot of cement must be sampled and tested in the usual way.

The work of inspection at the mill has added very considerably to the work of the Testing Laboratory. All but 1.6 per cent of the cement tested was sampled at the mill. An average of five inspectors is continually engaged in taking these samples and inspecting shipments. It is believed that the shipments during August, 1911, were the largest of any month in the history of any State work. During this month 411 cars and 23 boats, loaded with a total 92,015 barrels of cement, were shipped for use on Barge canal work. On August 17, 1911, the record for a single day for Barge canal work was made, when 7,150 barrels of cement were shipped.

SAND TESTS.

The importance of thorough examination and tests of the sands proposed for use on the Barge canal has been practically demonstrated. Forty-two samples of sand and gravel have been tested along the lines of tests established during the previous year. These tests are as follows: The sands are examined under the microscope for those elements that give the sand its characteristics. The other tests are for voids, loams, fineness, or grading, and tensile strength with cement. The latter are made from the sand in its natural condition and also washed; and the cement is a "standard" cement, made by mixing together in the laboratory several brands of cement which run nearly alike in the regular tests. All tests for tensile strength cover at least 28 days, but many long-time tests are being carried. Considerable attention has been given to the methods used in making the tests and it is believed that they are the most accurate that can be employed.

The "testing of sand" also includes the testing and examination of substitutes for sand, such as screenings and iron ore tailings.

OTHER TESTS.

Many other tests besides those already reported have been made in the laboratory. Tests and examinations of loams, heavy earth, paints, stone, water, wood preservatives, water-proofing and other miscellaneous materials have been made. Laboratory examinations have been aided by inspection upon the work.

Field inspection of materials proposed for use in concrete has been made a point of the duties of the Testing Laboratory. A more definite knowledge of these materials than can always be secured by the testing and examination of the sample submitted is a great aid in securing the best available material. Inspection of its use is also a help in considering the points of merit or demerit in the material.

Respectfully submitted,

RUSSELL S. GREENMAN,
Resident Engineer in charge of Tests.

Report of the Land Bureau of the State Engineer's Department.

ALBANY, N. Y., *October* 2, 1911.

Hon. JOHN A. BENSEL, *State Engineer and Surveyor:*

Sir.— I have the honor to present herewith a report on the various matters pertaining to the Land Bureau of your Department for the fiscal year ended September 30, 1911.

The Commissioners of the Land Office have applications for grants of land under water which are referred to this Department for examination and report; as are also a large number of miscellaneous matters relating to State lands. These matters require careful inspection and naturally consume a great deal of time.

The maps are examined to determine their correctness and proper form, both from an engineering standpoint and to insure their conformity to the rules and regulations of the Land Office. In some cases it is also necessary to visit and inspect the locations of the proposed grants to decide as to the advisability of making the grants on the lines of the application, or, if necessary, to have them modified. It is also at times deemed advisable to deny some of these applications on account of interference with navigation or with the rights of the public.

Some applications were contested or had remonstrances filed against them, and hearings have been necessary to determine the rights of the several interested parties and report the outcome to the Commissioners of the Land Office.

There have been made in this Department, for the use of the State Engineer and Surveyor and the Commissioners of the Land Office, maps showing all the lands under water granted by the Commissioners of the Land Office and the Legislature. These maps are brought up to date and are of great value for reference in adjusting land grants.

Eleven applications for grants of land under water were considered by this Department during the year. Two were for commerce, three for railroad purposes and seven for restricted beneficial enjoyment. The lands were in the following counties: Dutchess, Queens, Rensselaer, Richmond, Rockland and Westchester.

The State Engineer and Surveyor has sold at public auction all of those unappropriated lands of the State which have been ordered to be sold by the Commissioners of the Land Office.

The records of the office show that there were held during the year nine public auctions, at which thirteen parcels of land were sold. The sum of $2,973.25 was realized therefrom.

Of these lands ten parcels were acquired through the Comptroller's tax sales and three from foreclosure of loan mortgages. The lands are located in the following counties: Chenango, Kings, Richmond, Rockland, Tompkins and Westchester.

There has been the usual amount of correspondence and answering of inquiries from surveyors, lawyers and others on matters pertaining to the original maps and descriptions of the Colonial and early State surveys filed in this office. The answering of such inquiries often requires much study and time, as there are frequently more than one survey of the same land made at different times by various surveyors, and none should be overlooked. These maps become more valuable as time passes; and as a large part of them are very old and describe lines of tracts of lands which have become, in many instances, the boundaries of towns and counties, the value of these records becomes still greater.

For better preserving these records they have been rearranged, placed in bound volumes and indexed for convenience of reference. That it is the proper method for the care of these valuable papers, and that it affords greater facility of finding particular papers with the certainty that none have been overlooked, has already been fully demonstrated.

Respectfully,

MERRITT PECKHAM, JR.,
Assistant Engineer in charge of Land Bureau.

New York-Vermont Boundary Line

New York-Canadian Boundary Line

New York-New Jersey Boundary Line

New York-Vermont Boundary Line.

ALBANY, *October* 17, 1910.

Hon. H. W. DEGRAFF, *Deputy State Engineer, Albany, N. Y.:*

Sir.— The following is a report on the examination of the New York–Vermont boundary line.

I began the work on October 3, 1910, and finished October 15, 1910. Assisted by K. M. Boutelle of the State Engineer's Department, I visited every monument on the line and found them all in first-class condition, excepting bounds Nos. 99 and 101.

Bound No. 99 seems to be very solid in its foundation, but it leans toward the south about two or three inches. I do not think there is any necessity of resetting this stone. Monument No. 101 could not be found. I consulted Mr. Randall, who was in charge of this line when it was run, and he informed me that the bound lies in the bottom of the Poultney river. About three years ago in the spring a heavy freshet occurred. The bank of the river was washed toward the south about fifty feet and the stone undermined. The local farmers say that the stone now lies in the bottom of the river under three or four feet of gravel.

A tabulated report of each stone and a description of its location will be found in a note book accompanying this report.

Very truly yours,

H. J. STABILE.

New York-Canadian Boundary Line.

November 14, 1910.

Hon. H. W. DeGraff, *Deputy State Engineer, Albany, N. Y.:*

Sir.— I beg leave to submit herewith a report on the examination of the boundary line between the Dominion of Canada and New York State.

On October 26, 1910, Mr. M. F. Cochrane, representing the Commission for Canada, and myself met at Rouses Point and began our work at monument No. 645A, near the west bank of the Richelieu river, and followed the line westerly to the St. Lawrence river, which was reached on the 12th of November.

The monuments marking this line were, with nine exceptions, in good condition. Monuments Nos. 709, 710, 713, 738, 751A, 753, 761 and 770 have been heaved by the frost, so that they are out of plumb from one to three feet, but still are very solid in their foundations.

Accompanying this report is a note book containing a tabulated report and a description of the location of each monument.

Respectfully yours,

H. J. STABILE,
Representative of New York State.

New York-New Jersey Boundary Line.

December 31, 1910.

Hon. H. W. DeGraff, *Deputy State Engineer, Albany, N. Y.:*

Sir.— I hereby report that I have finished the examination of that part of the New York–New Jersey boundary line lying in New York bay, the Kill von Kull, Arthur kill and Raritan bay. The line at this point is marked by 56 range monuments, situated on the shores of New Jersey and Staten Island. Fourteen of these were not found; of these 10 have been destroyed and should be replaced.

I have also examined the upper New Jersey line, extending from the Hudson river to the Delaware river, as far as monument No. 85, situated about fifteen miles east of Port Jervis. Of this line, as far as I have examined it, there are five monuments which should be reset. The line generally is in very good condition. I expect to examine the remaining fifteen miles within the next few days. The details of my report will be found in a field book filed in this Department.

Respectfully,

A. T. O'LEARY,
Assistant Engineer.

REPORT

OF

Coöperation of United States Geological Survey

WITH

STATE ENGINEER AND SURVEYOR

OF THE

STATE OF NEW YORK

1911

Coöperative Topographic Survey of New York.

DEPARTMENT OF THE INTERIOR, UNITED STATES GEOLOGICAL SURVEY, WASHINGTON.

OFFICE OF THE DIRECTOR.

January 11, 1912.

Hon. JOHN A. BENSEL, *State Engineer and Surveyor, Albany, N. Y.:*

Sir.— In reply to your letter of January 8:

I have the honor to transmit herewith a report made by Frank Sutton, Geographer in charge of the Atlantic Division of this Survey, on results of topographic work prosecuted in the State of New York during the calendar year beginning January 1, 1911, and ending December 31, 1911.

Very respectfully,

GEO. OTIS SMITH,
Director.

REPORT OF TOPOGRAPHIC SURVEYS IN COÖPERATION BETWEEN THE UNITED STATES GEOLOGICAL SURVEY AND THE STATE OF NEW YORK FOR THE CALENDAR YEAR ENDED DECEMBER 31, 1911.

In accordance with the coöperative agreement signed July 11, 1911, by George Otis Smith, Director, for the United States Geological Survey, and by John A. Bensel, State Engineer and Surveyor, August 1, 1911, for the State of New York, the Federal Survey allotted $10,000 and the State $10,000, for coöperative topographic surveys in the State of New York during the fiscal year July 1, 1911, to June 30, 1912:

The following is a summary of the field and office work accomplished during the above period under the general direction of R. B. Marshall, Chief Geographer, and under the immediate supervision of Frank Sutton, Geographer of the Atlantic Division.

The work from January 1 to June 30, 1911, was continued under the appropriation for the fiscal year ended June 30, 1911, the results accomplished during the first six months of that year being given in the report of the State Engineer and Surveyor for 1910.

FIELD WORK.

Quadrangle.	Counties.	Published on scale of	Area mapped.	Primary Levels.		Traverse, secondary.	Triangulation.	
				Miles.	Permanent B. M.'s.		Stations occupied.	Stations marked.
			Sq. miles.			*Miles.*		
Rochester	Monroe	1 : 62,500	Revision					
Number Four	Herkimer and Lewis.	1 : 62,500	60	27	8	411		
Lowville	Lewis	1 : 62,500	127	9	2	273		
Lyon Mountain	Clinton and Franklin.	1 : 62,500	213	71	20	909		
Dannemora	Clinton	1 : 62,500	213	44	13	530		
Bonaparte	Jefferson, Lewis and St. Lawrence	1 : 62,500	6			14		
Corning	Steuben	1 : 62,500					7	3
Total			619	151	43	2,137	7	3

The following members of the United States Geological Survey were engaged in the field work:

Topographic Mapping:

C. E. Cooke, topographer.
J. M. Whitman, topographer.
R. C. McKinney, topographer.
W. H. S. Morey, assistant topographer.
J. I. Gayetty, assistant topographer.
Olinus Smith, assistant topographer.
J. H. LeeFeaver, junior topographer.
J. B. Metcalfe, junior topographer.

Primary Traverse and Triangulation:

G. T. Hawkins, topographer.

Levels:

K. E. Schlachter, topographic aid.
Henry H. Otto, topographic aid.
J. M. Perkins, topographic aid.
D. M. Sullivan, topographic aid.
Harvey Malcolm, topographic aid.

The office drafting for the revision of culture on the Rochester sheet was completed. The drafting of 10 per cent of the Lowville, 9 per cent of the Lyon mountain, and 5 per cent of the Dannemora sheet was finished on December 31, 1911.

The adjustment of the levels for the Number Four, Lowville, Lyon mountain, Dannemora and Corning sheets was completed, and the field notes typewritten and prepared for publication.

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